REPORT ON THE REMEDIAL INVESTIGATION OF THE ROSE CHEMICALS SITE HOLDEN, MISSOURI

APPENDIX E - BUILDINGS AND STRUCTURES INVESTIGATION TECHNICAL MEMORANDUM

FOR

CLEAN SITES, INC.

VOLUME VI

February 1990

88-025-4

Burns & McDonnell Engineering Company
Engineers-Architects-Consultants
Kansas City, Missouri

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PART I

INTRODUCTION

The buildings and structures investigations at the Rose Chemicals Site (Site) were conducted to obtain additional data which will aid in the characterization of the presence, types, amounts, and extent of contaminants in both major buildings and associated structures.

The purpose of this memorandum is to document the investigation activities. Specifically, this memorandum includes the following:

- o results of records review,
- o results of buildings and structures inspections,
- o sampling procedures and locations,
- o decontamination procedures, and
- o management of investigation generated waste.

This document was prepared in accordance with Section 5.7.4 of the Final Work Plan for the RI/FS at the Rose Chemicals Site in Holden, Missouri, Clean Sites, Inc., June 30, 1988. No analytical results of samples obtained during the investigation activities discussed in this document are included.

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PART II

RECORDS REVIEW

A. DOCUMENTS

Burns & McDonnell has reviewed all documents provided by Clean Sites, Inc. (CSI) and the Missouri Department of Natural Resources (MDNR) which pertain to past operations and assessment activities performed at the direction of the Rose Chemicals Steering Committee, the U.S. EPA, or the MDNR. This review and its findings are summarized in the remainder of this section. The documents reviewed were:

1. Sampling/Analytical Survey, Rose Chemicals Site, Holden, Missouri, Dr. Harry V. Drushel, CSI, June 12, 1987.

2. Preliminary Site Assessment Report, Rose Chemical Project, Holden, Missouri, Site Investigation, John Mathes & Associates, Inc., July 31, 1987.

3. Preliminary Site Assessment Report, Addendum Number 1, Rose Chemicals Project, Holden, Missouri, Site Investigation, John Mathes & Associates, Inc., October 30, 1987.

4. Various file documents of the MDNR pertaining to the Rose Chemicals Site and Holden Publicly Owned Treatment Works (POTW).

5. E. T. Archer & Company memorandum from Charles Nance to Dr. Glenn Paulson, CSI, April 15, 1987, regarding Preliminary Report of Findings: Rose Chemicals Site, Field Investigation.

6. E. T. Archer & Company memorandum from Wilbur Sounders to Mr. Cliff Kline, CSI, regarding Storm Drain Testing at the Rose Chemicals Site.

7. CSI memorandum from Jerry Hollingsworth to Robin Robinson regarding concrete work on Rose Site.

8. Final Work Plan for Remedial Investigation/Feasibility Study at Rose Chemicals Site in Holden, Missouri, ERT Engineering Company, June 30, 1988.

B. SITE HISTORY

While none of the above documents contain specific records of past operations, the following paragraphs present general Site history information, as well as some specific events which provide information concerning the possible nature and location of contaminants in and around the Site.

The Site is owned by the City of Holden and was previously known as the Holden Industrial Park. The South Warehouse was built in the late 1940's and International Harvester Company is believed to have initially used it as a shop. The Main Building was constructed in stages in the 1960's.

Royal Industries, Inc. was the first company to lease the Site with the Main Building, having entered a lease with the City on June 1, 1976. Lear Siegler, Inc. in early 1977 acquired the stock of Royal and in June, 1977 Royal was merged into Lear with the result that Lear succeeded to Royal's interest under the lease. Royal operated a farm implement assembly and painting operation at the Site until early in 1980. In December, 1979 Lear entered into a sub-lease with W. C. Carolan Company, Inc. and assigned Lear's option to purchase the site to Carolan. Carolan's first PCB handling company was named PCB Eliminators which was a transfer facility and was in business for approximately one year. In 1982 Martha C. Rose Chemicals, Inc. (Rose) began processing PCBs and PCB-contaminated equipment at the Site, although, so far as can be determined, there was no written sub-lease or assignment between Carolan and Rose. Carolan was one of several companies all operating under the same ownership, primarily that of Mr. Walter C. Carolan, which included: Dust Suppression, Inc.; American Steel Works, Inc.; as well as W. C. Carolan Company, Inc. and Rose.

On January 24, 1984, a gasoline leak of approximately 1,200 gallons occurred from an underground storage tank owned by the Casey's General Store located in Holden southeast of the Site. The spill entered the City's wastewater collection system.

On June 24, 1985, a gasoline leak occurred at the Fast Stop convenience store located in Holden southeast of the Site. The gasoline was discovered

to have entered the wastewater collection system. No estimate of the volume of gasoline released is available.

In mid-August of 1985, a complaint was received by the Missouri Water Pollution Control Program relative to suspected dumping of PCB materials by Rose. On September 18, 1985, samples of creek sediment and municipal sludge taken by the MDNR indicated PCB contamination.

On September 23, 1985, an oil sheen was observed on the Holden POTW influent. The sheen dissipated before the source could be determined.

On October 2, 1985, a more comprehensive set of samples was taken of water, sediment, and soil from the East Pin Oak Creek in and around Holden by MDNR representatives.

On December 6, 1985, during a municipal sludge sampling event being conducted by Langston Analytical Laboratories' representatives, a release of sludge into the East Pin Oak Creek occurred. The release was estimated at 26,500 gallons. Where possible, samples were obtained downstream at that time to assess the resulting contamination.

In February of 1986, operations were ceased at the Site. Approximately 14 million pounds of PCBs and PCB materials were abandoned at the Site.

In March of 1986, the Missouri Department of Conservation obtained biota samples (fish and frogs) from the Pin Oak Creek and its tributaries.

On May 16, 1986, at the now abandoned Site, a tanker trailer parked since operations ceased, leaked PCB liquid which flowed into the unnamed tributary of the East Pin Oak Creek.

During September of 1986, O.H. Materials Company environmentally stabilized the Site and obtained samples of soil, sediment, water, and air from the Site, the Site perimeter, the unnamed tributary and East Pin Oak Creek, the POTW, and background areas around Holden.

From October of 1986 through early May of 1987, Chemical Waste Management - ENRAC Division conducted a comprehensive surface soil sampling program, as well as water sampling of on-site detention ponds and pits. Also, air samples were taken at the perimeter of the Site, as well as in the Main Building work area via personal air monitoring devices.

On April 15, 1987, E.T. Archer & Company inspected and dye tested the storm water collection and discharge system at the Site.

During June and July of 1987, John Mathes & Associates (JMA) performed Site investigations which included shallow soil sampling, geological test drilling, installation of three shallow and three deep monitoring wells, groundwater sampling, and surface geophysical investigations.

During August and September of 1987, JMA conducted further investigations at the Site which included surface soil sampling along the southern Site

boundary, geological test drilling and soil sample collection in the Main and South Warehouses, drinking water assessment in the Holden area, and groundwater sampling of six on-site monitoring wells.

In February 1988, the latest sludge sample from the Holden POTW showed no PCB contamination.

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PART III

BUILDING AND STRUCTURES INSPECTION

In accordance with Section 5.7.2 of Final Work Plan for Remedial Investigation/Feasibility Study at Rose Chemical Site in Holden, Missouri, ERT Engineering Company, June 30, 1988, an inspection of the Main Building and South Warehouse was conducted. The inspection was completed in two phases. The first phase consisted of recording all grid locations and visibly stained areas and their proximity to floor cracks, joints, drains, or exposed soil. The second phase consisted of recording materials of construction and assessing the general structural conditions of both buildings. A photographic log was maintained of the major findings of each phase.

The first phase consisted of developing written and photographic records of visibly stained areas, concrete seams, concrete cracks, and damaged concrete so that possible pathways of contaminants through the building floors could be located. To allow a more detailed presentation of the findings, the Main Building was divided up into four areas (see Figure III-1) labelled A, B, C, and D. The findings in each area are presented in Figures III-2, III-3, III-4, and III-5 respectively. The findings in the South Warehouse are presented in Figure III-6.

Stains, cracks, and seams were evident throughout both buildings. Notably less staining was noticed in Area D (see Figure III-5). However, large portions of this area were still covered with EPA-return material. Stains were evident in grids 32, 33, and 34 of Area C (see Figure III-4) and in grid 40 of the South

Warehouse (see Figure III-6). These stains were oily and beaded water in some cases. A drain in the loading dock area of grid 2 of the Main Building (see Figure III-2) was noted. A suspected degreasing pit was located in the northwest corner of grid 38 in South Warehouse (see Figure III-6). The photographs in Appendix A illustrate typical cracks and stains found during the inspection. Also pictured are the drain and pit mentioned above.

The second phase was an assessment of structural integrity. The complete report associated with this assessment is located in Appendix B. The inspection recorded construction materials and the general structural integrity of both buildings. It generally concluded that in all but Area C (see Figure III-1) the structural integrity was intact. However, it was noted at several locations throughout both buildings that lateral stability was in question. Also, along the south boundary of Area C (where the concrete block wall has been partially demolished), several situations were noted which may adversely affect the ability of the existing roof in this area to support load. Finally, damage to the structural skin was noted throughout both buildings.

* * * * *

PART IV

SAMPLING PROCEDURES AND LOCATIONS

A. GENERAL

Several different sampling activities were performed to characterize building and structure contamination. These activities included: wipe sampling of the building floor, wall, ceiling and roof surfaces; structural (destructive) sampling of concrete, insulation, and nonimpervious materials; and sampling of soils from underneath the buildings through borings and test trenches.

Quality control samples, including replicates and collocated samples, were submitted to the project laboratory - EMS Laboratories. In addition, a series of split and collocated samples was submitted to the Region VII U.S. EPA Laboratory in Kansas City, Kansas to assess sampling and analytical quality. This was done in lieu of preparing EPA splits of all samples taken. No samples were submitted to the EPA Laboratory for assessment of internal EPA Laboratory quality control.

EMS Laboratories supplied sample bottles for all field activities including EPA quality control samples.

B. SURFACE SAMPLING

Wipe samples of structural surfaces were obtained according to the Sampling and Analysis Plan, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell

Engineering Company, January 1989 (SAP). Wipe samples were taken from floors, walls, ceilings, horizontal surfaces, and roofs. A total of 215 scheduled wipe samples were taken, including collocated samples which were obtained to test sampling and analytical quality assurance/quality control (QA/QC). The field completeness for the activity was 100 percent. Fifteen collocated wipe samples were delivered to U.S. EPA for analysis.

1. WIPE SAMPLE PROCEDURES

Wipe samples of structural surfaces were obtained from within the Main Building and South Warehouse, and from the roofs and extension walls of these two buildings. A grid system was established in the Main Building and South Warehouse to designate specific areas for wipe sampling. The Health and Safety procedures for all wipe sampling activities were outlined in the Site Health and Safety Plan, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell Engineering, January 1989 (HSP).

The method of wipe sampling followed is presented in the reference, Verification of PCB Spill Cleanup by Sampling and Analysis, U.S. EPA, EPA-560/5-85-026, August 1985. Using a hand covered with a clean surgical glove, a filter paper (Whatman 4D ashless) was wetted with hexane. One side of the filter paper was used to wipe the 100-cm^2 area horizontally. The filter paper was turned over and the other side was used to wipe the area vertically. A disposable (cardboard) template was used for each wipe to avoid cross contamination. After wiping, the filter paper was stored in a clean jar, labeled and iced.

Prior to collecting a wipe sample, the surface to be sampled was photographed and logged. The sample number, grid number, location, materials of surface construction, and any other observations were recorded in the field log book.

Collocated wipe samples were taken by placing another template directly adjacent to the original-sample grid template. The collocated and original sample were taken at the same time using two separate filter papers. The first filter paper was wiped horizontally on the original sampling grid, and the second filter paper was wiped horizontally on the collocated sampling grid. The first filter paper was then wiped vertically on the collocated sampling grid and the second filter paper was wiped vertically on the original sampling grid. The filter papers were placed in appropriate sample containers and identified with unique sample identification numbers. Sample stations where collocates were collected were documented in the field logbook.

Wipe samples were analyzed for PCBs using analytical method 3540/8080 from the reference, Test Methods for Evaluating Solid Waste, SW-846, U.S. EPA, 1986b.

2. WIPE SAMPLES AND LOCATIONS

A total of 215 scheduled wipe samples were taken at the Site including 23 collocated samples. Of these, 161 were unbiased wipe samples and 54 were biased wipe samples. Unbiased wipe samples were taken from

locations designated by the SAP with two exceptions. Biased wipe samples were taken from stained or oily areas.

Floor wipe samples were taken at the locations shown in Figures IV-1 and IV-2. Forty-eight unbiased floor wipes were taken from the approximate center of each grid. The two exceptions from the SAP are grid number 62 in Figure IV-1 and grid number 43 in Figure IV-2. Grid number 62 is a ramp to the west dock of the Main Building. It was added as a wipe grid during the field investigations. The SAP had called for surface soils in this area to be sampled. Grid 43 does not appear in Figure IV-2. In the SAP, it showed as a small concrete slab at the southwest corner of the Main Building. The small slab was removed during preliminary cleanup operations, and the area was sampled for surface soils during the re-investigations. Thirteen biased samples were taken from the floor on visibly stained surfaces. Two scheduled collocated samples were taken; and, three collocated samples were submitted to the U.S. EPA. A floor wipe sample matrix can be found in Table IV-1.

Sixty-two interior-wall wipe samples were taken at the locations shown in Figures IV-3 and IV-4. Unbiased wall samples were taken at a height approximately 5 feet above the floor. An additional sample was taken directly above the 5-foot high wipe sample at the approximate midpoint between the 5-foot high wipe sample and the building roof. If the wall surface sampled was insulated, then a core sample of insulation was taken (see Paragraph C.2) prior to taking the wall wipe sample. After the core was taken, additional insulation was removed to allow placement

of the template over the building wall materials. Ten wall wipe samples were taken from the below grade pits in designated grids 23 and 27. A wipe sample was taken from the midpoint of each pit wall. Thirteen biased-wall wipe samples were taken from visibly stained surfaces. An interior wall wipe sample matrix can be found in Table IV-2.

A total of 22 unbiased ceiling wipe samples were taken at the locations shown in Figures IV-5 and Figure IV-6. Five collocated samples were samples taken. The samples were taken at the approximate centers of the grids. If the ceiling surface sampled was insulated, then a core of insulation was taken (see Paragraph C.2) and the wipe was taken of the surface behind the insulation. Table IV-3 presents the sample matrix for the ceiling wipes.

Thirty-five horizontal wipe samples were taken from the locations shown in Figures IV-7 and IV-8 including 5 collocated wipe samples. Horizontal samples were taken from the approximate centers of the grids. Fifteen biased samples were taken from visibly stained horizontal surfaces. Table IV-4 presents the sample matrix for the horizontal wipes.

Thirty-five wipe samples were taken from the roof and exterior walls of the Main Building and the South Warehouse as shown in Figures IV-9 and IV-10. Thirteen biased samples were taken. Table IV-5 presents the sample matrix for the roof and exterior wall wipes.

C. STRUCTURE SAMPLING

Three types of structural sampling activities were performed. These were concrete coring of floors, coring of insulation on walls and ceilings, and sampling of miscellaneous nonimpervious surface materials. All structural samples were analyzed for PCBs. The analytical method 3540/8080 from Test Methods for Evaluating Solid Waste, SW-846, U.S. EPA, 1986b, was followed.

1. CONCRETE CORES

Concrete samples were taken as cylindrical concrete cores. The number and location of the concrete cores are presented in Figures IV-11 and IV-12. Concrete cores were taken using a 1.5-inch diameter core barrel and an electric concrete coring machine. The rotating core barrel was advanced through the concrete floor slab cutting a cylindrical sample which was removed for subsequent analysis. The upper 0.5-inch of each core was separated from the rest of the core using a hacksaw. The blade was replaced with a clean blade between core samples. The top 0.5-inch of each concrete core and the remaining cylindrical core sample were then immediately stored in separate clean jars, labeled, and placed on ice for shipment to the laboratory. The 0.5-inch core section was pulverized at the laboratory using a clean mortar and pestle or ceramic ball mill prior to analysis. The remainder of each core sample was stored in a clean jar and refrigerated to 4 degrees C at the laboratory. The remaining samples will be discarded upon determination that further analyses are not needed. Each core sample was individually labeled and entered onto the Chain-of-Custody Record.

For the unbiased samples, after the 1.5-inch-diameter core was removed, an 8-inch-diameter hole was cored through the floor slab to facilitate an interior boring to be advanced at the same location.

A total of 25 concrete corings were taken from the Main Building and the South Warehouse. The field completeness for this activity is 100 percent. Twelve cores were unbiased and were taken from the approximate center of their designated grid. Thirteen core samples were biased samples. The location of the biased samples was determined by the presence of visible staining.

2. INSULATION

Insulation cores were taken where a wall or ceiling surface to be wipe sampled was covered with insulation material or where the insulation was visibly stained. The identification numbers and locations of the insulation cores are shown in Tables IV-6 and Figures IV-3 to IV-6. A total of 41 samples was taken. The field completeness for this activity is 115 percent. Fourteen biased and five collocated insulation core samples were taken. All insulation encountered was plastic covered fiberglass. The biased samples were taken in order to assess the nature and extent of PCBs on visibly stained surfaces. A decontaminated hand corer was used to obtain the samples. The sample was stored in a clean jar on ice, labeled, and shipped to the lab.

3. NONIMPERVIOUS SURFACE MATERIALS

Eight destructive samples including two replicates of nonimpervious surface materials, consisting of wood and flooring tile, were obtained. The samples were obtained using an appropriate decontaminated tool (e.g., chisel, saw, knife). The field completeness for this activity is 100 percent. The locations and types of sample can be found in Figure IV-13 and Table IV-7.

Prior and subsequent to collecting a sample, the structures to be sampled were photographed and logged. The materials of surface construction and any other observations were also recorded.

D. SOIL SAMPLING

Soil samples were taken from the soils underlying the buildings. Samples were taken from 21 interior borings and from two test trenches, one in the Main Building and one on the Main Building loading dock. A total of 133 samples was taken from the borings. Of those samples 90 were submitted for analysis for PCBs, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). The borings were logged.

The Test Trench TT-1 was excavated to bedrock and a soil profile constructed. A total of 16 samples were taken from the trench. Nine were submitted for analyses of PCBs, VOCs, and SVOCs.

Test Trench TT-2 was excavated in the loading dock of the Main Building to an approximate depth of 8 feet. A total of 10 samples was taken from the trench. All were submitted for analyses of PCBs, VOCs, and SVOCs.

1. INTERIOR BORINGS

Twenty-one interior borings were drilled at the locations shown in Figures IV-11, IV-12, and IV-14 in the existing Main Building, the South Warehouse, and the loading dock of the Main Building. Each interior boring was advanced into soil after the concrete slab had been cored to 8 inches in diameter with an electric coring machine. The subsurface soil was sampled continuously using standard penetration test split spoon sampler according to ASTM D1586. Logs for all 21 interior borings are located in Appendix C.

The interior borings in grids 23, 25, and 39 were advanced to auger refusal at the top of bedrock by using a stainless steel manual bucket auger. Soil samples were collected from the bucket auger in these borings on 1-foot centers to the completed depth of the bedrock. The use of the manual bucket auger was necessary due to the lack of overhead clearance in these areas.

A total of 83 soil samples including 12 replicates of various lengths (see Table IV-8) were taken from B-1 through B-12. The borings were advanced to bedrock. Fifty-seven samples were selected for chemical analyses for PCBs, VOCs and SVOCs.

Interior Borings B-13 through B-21 were sampled to further define the presence of potential PCB concentrations beneath the loading dock of the Main Building. These borings were located in the Main Building grid system and were drilled in the same manner as B-1 through B-12. Therefore, they are considered to be within the set of interior borings. B-13 through B-21 were sampled to the depth that the orange and gray mottled clay horizon was found with the exception of Boring B-13. This boring was sampled to a depth of 10.5 feet, but the orange and gray mottled clay was not encountered. The orange and gray mottled clay horizon was selected as the boring end point because it lies directly above the bedrock in this location.

Fifty soil samples including 4 replicates were taken from B-13 through B-21. Thirty-three of these were submitted for chemical analysis for PCBs, VOCs, and SVOCs, according to criteria established in the SAP - Addendum 1.

A sample matrix is presented in Table IV-8 identifies interior boring samples, sample depths, and analyses performed. Upon completion the borings were filled with cement grout to floor grade to prevent subsurface contamination.

All soil samples slated for chemical analysis were placed in appropriate sample jars. When possible, a portion of each soil sample collected was stored in a separate glass jar for possible subsequent testing for engineering properties. Eleven soil samples from interior borings were

tested at the Kansas City Testing Laboratory for moisture content, Atterberg limits, and hydrometer analysis.

Sixteen replicate samples were taken. The replicates were collected from the same section of the sampler as the original sample. To collect replicate samples, the long cylindrical sample which results from a split-barrel sampler or a manual bucket auger was split longitudinally with a decontaminated knife. One split half of the long cylindrical sample was used to fill one set of jars and the second split half was used to fill another set of jars, producing similar sample portions for two replicate samples. If the volume from a single bucket auger barrel or split spoon sampler was insufficient to obtain two replicate samples, soil from the next bucket auger barrel or split spoon sampler was used. The replicates were placed in separate containers. The replicates were identified with unique sample identification numbers and the sample station where the replicates were collected was documented in the field logbook.

All samples, sampling tools, and sample jars were handled with clean, disposable gloves. The soil samples were removed from the samplers using a clean stainless steel sample knife. New clean gloves were worn for handling each sample. Samples collected for VOC analyses were placed in containers quickly with minimal air spaces to minimize volatilization.

2. TEST TRENCHES

Test Trench TT-1 was excavated to the top of bedrock within grid 3 in the Main Building as shown on Figure IV-15. The trench dimensions were 2.6 feet by 30 feet and 12 feet deep. The trench was oriented in an east-west direction. A profile of the trench and the location of the soil samples are shown in Figure IV-16. Test Trench TT-2 was excavated approximately 8 feet below surface within grid 10 on the loading dock of the Main Building as shown on Figure IV-14. The trench dimensions were 3 feet by 30 feet by 8 feet deep. The trench was oriented in a north-south direction. A profile of the trench and the location of the soil samples are shown in Figure IV-17.

The concrete floor slabs at the trench locations were first saw-cut and removed. The overburden soil was then excavated with a backhoe and stockpiled beside the trench on plastic sheeting. The health and safety requirements for the test trench excavations detailed in the HSP were followed.

Seventeen soil samples including 1 replicate were obtained from TT-1 at the discretion of the engineer or geologist to provide a representative cross-section of the trench. Nine of the 16 samples were analyzed for PCBs, VOCs, and SVOCs. All 16 samples were shipped to the laboratory and were stored. Ten soil samples including one replicate were taken from TT-2 at the location shown in Figure IV-17. All samples were submitted for analyses of PCBs, VOCs, and SVOCs.

The determination of which samples to submit for analysis was based on visual discoloration, organic vapor readings, and spatial distribution. The samples were obtained from soil in the bucket which had not come into contact with the bucket of the backhoe. The samples were placed into the sample containers using a stainless steel sample knife. No personnel entered the trench during the excavation, sampling or backfilling activities.

The investigative and replicate samples were obtained from the same location in the backhoe bucket. The investigative and replicate sample containers were filled alternately using a stainless steel sampling knife with portions of the sample so that the replicate samples sent for analyses were as similar as possible.

Complete photographic logs of the sides and bottom of both TT-1 and TT-2 were made prior to backfilling.

The soil sample knife and the backhoe bucket were decontaminated following the procedures outlined in Part V.

Upon completion of sampling, the trenches were backfilled with clean, uncontaminated gravel mixed with bentonite. The gravel was purchased from a commercial supplier. The backfill was placed in individual compacted lifts. The material was placed and compacted with the backhoe bucket. The surfaces were sealed to floor grade with cement.

* * * * *

PART V

DECONTAMINATION

All decontamination procedures for the interior boring, excavation, and sampling equipment are described in this section.

A. BORING AND EXCAVATION EQUIPMENT

All interior boring and sampling equipment was decontaminated by Layne-Western, both prior to and also between borings. A decontamination area, consisting of a metal open-top water tank underlain by plastic sheeting, was set up by Layne-Western prior to sampling. All augers were placed in the open-top tank and cleaned using a high-pressure hot water sprayer. All exposed exterior and interior surfaces of the augers were cleaned until all visible soil was removed.

The backhoe bucket was decontaminated by Layne-Western, before and after excavation. The backhoe bucket was placed in the open-top tank and cleaned using a high-pressure hot water sprayer. All exposed surfaces were cleaned until all visible soil was removed.

After all visible soil was removed from the soil boring and excavation equipment, the following decontamination procedure was performed:

1. The augers were scrubbed with an Alconox solution consisting of one tablespoon of Alconox per one gallon of water.

2. The equipment was then rinsed with a supply of pesticide-grade methanol contained in labeled 1-quart plastic squeeze bottles or sprayers.

3. A final rinse of the equipment was made using deionized water.

B. SOIL SAMPLING EQUIPMENT

All split-barrel soil samplers and stainless steel sample knives were decontaminated prior to the collection of each sample.

The following arrangements were made for decontamination of sampling equipment:

1. The Holden potable water supply was chemically analyzed prior to use.

2. A clean 5-gallon plastic container was filled with potable water. An Alconox solution was mixed in the container consisting of one tablespoon of Alconox per one gallon of water.

3. A supply of pesticide-grade methanol was placed in labeled 1-quart plastic squeeze bottles or sprayers.

4. An empty container was provided to contain the methanol rinsings.

5. Deionized water was provided in labeled 1-quart plastic squeeze bottles or sprayers.

Prior to sampling, the sampling equipment was scrubbed clean using the Alconox solution and a stiff long bristle scrub brush. After the solution scrub, the equipment was rinsed with deionized water and then sprayed with methanol over the second container. After the methanol rinse, the equipment was allowed to dry. All decontamination fluids were retained and disposed of as described in Part VI.

* * * * *

PART VI

INVESTIGATION GENERATED WASTES

Field investigation activities resulted in the generation of potentially contaminated materials. Management of the wastes generated during the investigation required compliance with federal and state requirements for generation, storage, transportation, and disposal. Potentially contaminated materials generated during the field investigation included such materials as decontamination fluids, disposable clothing and equipment, and boring cuttings.

All investigation generated solid wastes will be disposed of off-site at Chemical Waste Management's TSCA/RCRA landfill in Emelle, Alabama. All decontamination fluids were collected and are to be treated on site using a Carb-trol activated carbon adsorption system.

Wastes generated by the field operations consisted of:

- Decontamination Fluids. These fluids included wash waters used to decontaminate personal safety equipment and drilling and sampling equipment. The wash waters were collected and pumped to an on-site open-top tank for storage and subsequent activated carbon treatment.

- Personal Protective Clothing and Equipment. This category includes the disposable work clothing such as boot covers, gloves, tyvek

coveralls, and spent respirator cartridges worn on-site by field personnel during the field investigation. The procedure for handling disposable personal protective clothing is to place such articles in DOT (Department of Transportation)-approved 55-gallon drums which are stored on-site until the completion of the field investigation.

- Boring Cuttings. These are soil and rock generated during the sampling of the interior borings. These soil materials were stockpiled and covered by plastic sheeting to be disposed of off-site at a later time.

- Excavated Material. All material excavated during the sampling of the test trench was stockpiled and covered by plastic sheeting to be disposed of off-site at a later time.

* * * * *

TABLES

Table IV-1
FLOOR WIPE SAMPLE MATRIX

Wipe No.	Grid No.	Biased	Collocated	Location
1	3			Center
2	11			Center
3	4			Center
4	12			Center
5	13			Center
6	7			Center
7	6			Center
8	8			Center
9	14			Center
10	15			Center
11	16			Center
12	17			Center
13	24			Center
14	25			Center
15	18			Center
16	31			Center
17	32			Center
18	32		X	Center
19	33			Center
20	34			Center
21	35			Center
22	29			Center
23	26			Center
24	19			Center
25*	19		X	Center
26	20			Center
27	20		X	Center
28	21			Center
29*	21		X	Center
30	28			Center
31	30			Center
32	22			Center
33	37			Center
34	36			Center
37	2			Center
38	1			Center
39	9			Center
40	10			Center
41	13	X		NE Quadrant
42	21	X		Center of N Half
43	32	X		SW Quadrant
44	33	X		NW Quadrant
45	28	X		SW Quadrant
46	35	X		NW Quadrant
47	22	X		NE Quadrant
48	4	X		NE Quadrant

Table IV-1
FLOOR WIPE SAMPLE MATRIX
(Continued)

Wipe No.	Grid No.	Biased	Collocated	Location
49	17	X		Center of W Half
50	62			Center
51	38			Center
52	39			To NW of Center
53	41			Center
54	40			Center
55	40	X		SE Quadrant
56	41	X		NE Quadrant
57	41	X		NW Quadrant
57B	41	X		NW Quadrant
58	42			Center
62	5			Center
127	23			NE Quadrant
128*	23		X	NE Quadrant
174	27			Center
Totals	61	13	5	

**Sample submitted to EPA.*

Table IV-2
INTERIOR WALL WIPE SAMPLE MATRIX

Wipe No.	Grid No.	Biased†	Collocated	Height Ft.	Location and Material
35	37			5	West Wall, Metal
36	37			5	North Wall, Metal
59	7			5	South Wall, Metal
60	7			9	South Wall, Metal
61	6			3	North Wall, Painted Concrete
63	15			5	East Wall, Metal
64	15			10	East Wall, Metal
65	12			5	North Wall, Painted Concrete
66	12			8	North Wall, Painted Concrete
67	3			6	South Wall, Metal
68	3			9	South Wall, Metal
69	17			5	South Wall, Metal
70	17			12	South Wall, Metal
71	17			5	West Wall, Metal
72	25			5	West Wall, Painted Concrete Block
73	25			7	West Wall, Painted Concrete Block
74	25			5	North Wall, Painted Metal
75	32			5	West Wall, Painted Concrete
76	32			8	West Wall, Painted Concrete
77	32			5	North Wall, Painted Concrete Block
78	34			5	North Wall, Painted Metal
79	30			5	East Wall, Concrete Block
80	19			5	South Wall, Brick
81	19			11	South Wall, Brick
82	10			3	North Wall, Concrete
83	1			3	East Wall, Concrete
84	38			5	East Wall, Painted Metal
85	38			11	East Wall, Painted Metal
86	41			5	South Wall, Metal
87	40			5	West Wall, Metal
88	40			10	West Wall, Metal
89	38	X		6	North Wall, East End, Metal
90	40	X		2	North Wall, Midpoint, Metal
91	39	X		6	East Wall, South End, Steel
129	23			5	North Wall, Painted Concrete
130*	23		X	5	North Wall, Painted Concrete
131	23			5	East Wall, Concrete
132	23	X		1	East Wall, North End, Concrete
133	23			5	South Wall, Painted Concrete
134	23			6	West Wall, Concrete
135	25	X		4	East Wall, North End, Painted Concrete Block
136	32	X		0.5	West Wall, South End, Painted Concrete Block
137	32	X		1	North Wall, Door
138	33	X		1	North Wall, Metal
139	35	X		3	North Wall, West End, Metal
140	13	X		2	Metal Post In NE Corner

Table IV-2
INTERIOR WALL WIPE SAMPLE MATRIX
(Continued)

	Wipe No.	Grid No.	Biased†	Collocated	Height Ft.	Location and Material
	141	7	X		3	South Wall, West End, Metal
	142	11	X		3	North Wall, Metal Door
	143*	11	X	X	3	North Wall, Metal Door
	144	17			12	West Wall, Metal
	145	25			7	North Wall, Painted Metal
	148	32			8	North Wall, Dirty Metal
	158	34			8	North Wall
	159	34		X	8	North Wall
	163	30			14	East Wall
	165	41			12	South Wall, Metal
	168	10			13	East Wall, Metal
	168A*	10		X	13	East Wall, Metal
	170	27			2	North Wall
	171	27			2	East Wall
	172	27			2	West Wall
	173	27			2	South Wall
Totals	62		13	4		

**Sample submitted to EPA.*
†All unbiased samples were taken at the midpoint between the two ends of the walls.

Table IV-3
CEILING WIPE SAMPLE MATRIX

	Wipe No.	Grid No.	Biased	Collocated	Location and Material Wiped
	146	25			Center – Painted Metal
	147	32			Center – Painted Metal
	149	28			Center – Painted Metal
	150	7			Center – Metal
	151	3			Center – Metal
	152	11			Center – Metal
	153	21			Center – Metal
	154	14			Center – Metal
	155	15			Center – Metal
	155A*	15		X	Center – Metal
	156	19			Center – Metal
	157	34			Center
	157A*	34		X	Center
	160	17			Center
	160A*	17		X	Center
	161	30			Center
	162	30		X	Center
	164	41			Center – Metal
	166	38			Center – Metal
	167	40			Center – Metal
	169	12			Center – Metal
	169A*	12		X	Center – Metal
Totals	22			5	

**Sample submitted to EPA.*

Table IV-4
HORIZONTAL WIPE SAMPLE MATRIX

Sample No.	Grid No.	Biased	Collocated	Location, Material
H-1	3			Center of Ceiling, Steel Beam
H-2	7			Center of Ceiling, Steel Beam
H-3	14			Center of Ceiling, Steel Beam
H-4	15			Center of Ceiling, Steel Beam
H-5	12			Center of Ceiling, Steel Beam
H-6	21			Center of Ceiling, Steel Beam
H-7	19			Center of Ceiling, Steel Beam
H-8	19		X	Center of Ceiling, Steel Beam
H-9	25			Center of Ceiling, Steel Beam
H-10	32			Center of Ceiling, Steel Beam
H-11	28			Center of Ceiling, Steel Beam
H-12	34			Center of Ceiling, Steel Beam
H-13	17			Center of Ceiling, Steel Beam
H-13A*	17		X	Center of Ceiling, Steel Beam
H-14	1	X		West Handrail, Steel
H-15	30			Center of Ceiling, Steel Beam
H-16	41			Center of Ceiling, Steel Beam
H-17	38			Center of Ceiling, Steel Beam
H-18	40			Center of Ceiling, Steel Beam
H-19	40	X		West Light Fixture, Enamel Over Steel
H-20	41	X		West Wall, 4 Ft. Above Grade, Steel Beam
H-21	10	X		Light Fixture, 12 Ft. Above Grade, East Wall
H-22	12			Center of Ceiling, Steel Beam
H-22A*	12		X	Center of Ceiling, Steal Beam
H-23	4	X		SE Corner, 10 Ft. Above Grade, Steel Pipe
H-23A*	4	X	X	SE Corner, 10 Ft. Above Grade, Steel Pipe
H-24	7	X		Light Fixture, Northwest Corner
H-24A*	7	X	X	Light Fixture, Northwest Corner
H-25	8	X		Steel Wall Beam, 8 Ft. Above Grade
H-26	20	X		Painted Steel Beam, 10 Ft. Above Grade
H-27	32	X		Fuse Box, 10 Ft. Above Grade
H-28	34	X		Light Fixture
H-29	24	X		East Wall, Small Steel Beam, 12 Ft. Above Grade
H-30	22	X		Steel Beam, South Wall
H-31	35	X		NW Corner of Overhead Crane
Totals	35	15	5	

**Sample submitted to EPA.*

Table IV-5
ROOF AND EXTERIOR WALL WIPE SAMPLE MATRIX

	Wipe No.	Biased	Collocated	E/R*	M/S†	Location (Height Above Grade – Ft.) Material
	92			E	S	North Wall (9), Steel
	93			E	S	East Wall (5), Steel
	94			E	S	East Wall (10), Steel
	95	X		E	S	West Wall, South Door (3), Painted Steel
	96	X	X	E	S	West Wall, South Door (3.5), Painted Steel
	97			E	S	West Wall (8), Steel
	98	X		E	S	West Wall, North Door, Steel
	99			R	S	East Roof
	100		X	R	S	East Roof
	101	X		R	S	East Side of Roof, Flat Area, Fiberglass Panel
	102	X		R	S	West Side of Roof, High Peak, Steel
	103			R	M	SW 1/4, South Roof, Steel
	104		X	R	M	SW 1/4, South Roof, Steel
	105			R	M	SE 1/4 of Roof Over Pit Area, Steel
	106			R	M	SW 1/4 of West Slope of NE Roof, Steel
	107			R	M	NE 1/4 of North Slope of South Roof, Steel
	108	X		R	M	South Slope Above Grid, Steel
	109	X		R	M	West Slope of N. Central Roof, Steel
	110	X		R	M	East Slope of N. Central Roof Air Vent Grid 33, Steel
	111	X		E	M	East Slope of N. Central Roof, Steel
	112			E	M	West Wall – 3' to North of South Door (9')
	113			E	M	West Wall – North End (8')
	114			E	M	North Wall – West End (8')
	115		X	E	M	North Wall – West End (8')
	116			E	M	North Wall Midway (10')
	117	X		E	M	East End of North Wall (6')
	118			E	M	East End of North Wall (12')
	119	X		E	M	Extreme Northern End of East Wall (4.5)
	120			E	M	North End of East Exterior Wall (14)
	121			E	M	Midpoint of East Exterior Wall (14)
	122	X		E	M	Sliding Door on East Exterior Wall (4')
	123			E	M	East End of South Exterior Wall (20' from Corner 7')
	124	X		E	M	Sliding Door on Dock/Grid 6 (0.5')
	125			E	M	South Exterior Wall (7')
	126			E	M	South Exterior Wall (7')
Total	35	13	4			

**E/R – Exterior Wall/Roof*
†M/S – Main Building/South Warehouse

Table IV-8
INTERIOR BORING SAMPLE MATRIX

Interior Boring No.	Sample No.	Sample Interval (Ft.)[1]	Chemical Analyses		
			PCBs	VOCs	Semivol.
B-1	SS-1	1.0-3.0	X	X	X
	SS-2	3.0-5.0			
	SS-3	5.0-7.0	X	X	X
	SS-4	7.0-9.0			
	SS-5	9.0-10.5			
	SS-6	10.5-12.0	X	X	X
B-2	SS-1	1.0-3.0	X	X	X
	SS-2	3.0-5.0			
	SS-3	5.0-7.0	X	X	X
	SS-4	7.0-9.0	X	X	X
	SS-5	9.0-11.0			
	SS-6	11.0-11.5	X	X	X
B-3	SS-1	0.8-1.8	X	X	X
	SS-2	1.8-2.6	X	X	X
	SS-3	0.8-1.8			
	SS-4*	1.8-2.6	X	X	X
B-4	SS-1	1.0-3.0	X	X	X
	SS-2	3.0-5.0			
	SS-3	5.0-7.0	X	X	X
	4A/SS-3*	5.0-7.0	X	X	X
	SS-4	7.0-8.5	X	X	X
	SS-5	8.5-10.2	X	X	X
B-5	SS-1	1.0-3.0			
	SS-2	3.0-5.0	X	X	X
	SS-3	5.0-7.0	X	X	X
	SS-4	7.0-8.5	X	X	X
	SS-5	8.5-10.0			
	SS-6	10.0-11.3	X	X	X
B-6	SS-1	1.0-3.0			
	SS-2	3.0-5.0	X	X	X
	6A/SS-2†	3.0-5.0	X	X	X
	SS-3	5.0-7.0	X	X	X
	SS-4	7.0-9.0	X	X	X
	SS-5	9.0-10.6	X	X	X

Table IV-8
INTERIOR BORING SAMPLE MATRIX
(Continued)

Interior Boring No.	Sample No.	Sample Interval (Ft.)[1]	Chemical Analyses		
			PCBs	VOCs	Semivol.
B-7	SS-1	1.0-3.0			
	SS-2	3.0-5.0	X	X	X
	7A/SS-2†	3.0-5.0	X	X	X
	SS-3	5.0-7.0	X	X	X
	SS-4	7.0-9.0	X	X	X
	SS-5	9.0-11.0	X	X	X
	SS-6	11.0-11.5			
B-8	SS-1	1.0-3.0	X	X	X
	SS-2	3.0-5.0			
	SS-3	5.0-7.0	X	X	X
	SS-3†	3.0-5.0		X	
	SS-4	7.0-9.0			
	SS-4†	7.0-9.0	X		X
	SS-5	9.0-11.0	X	X	X
	SS-6	11.0-11.9	X	X	X
B-9	SS-1	1.0-1.5	X	X	X
	SS-2	1.5-2.0			
	SS-3	2.0-2.5	X	X	X
	SS-3†	2.0-2.5	X	X	X
	SS-4	2.5-3.0	X	X	X
	SS-5	3.0-3.5			
	SS-6	3.5-4.0	X	X	X
	9A/SS-1*	1.0-1.5		X	
	9A/SS-4*	2.5-3.0	X		
B-10	HA-1	0.5-1.5	X	X	X
	HA-2	2.0-3.0	X	X	X
	HA-3	3.0-4.0	X	X	X
	HA-3†	3.0-4.0	X	X	X
	HA-4	4.0-5.0			
	HA-5	5.0-6.0	X	X	X
	HA-6	6.0-7.0			
	HA-7	7.0-8.0			
	HA-8	8.0-9.0			

Table IV-8
INTERIOR BORING SAMPLE MATRIX
(Continued)

Interior Boring No.	Sample No.	Sample Interval (Ft.)[1]	Chemical Analyses		
			PCBs	VOCs	Semivol.
B-11	SS-1	1.0-3.0			
	SS-2	3.0-5.0			
	SS-3	5.0-7.0	X	X	X
	SS-4	7.0-9.0	X	X	X
	SS-5	9.0-11.0			
	SS-6	11.0-13.0	X	X	X
	11A/SS-6	11.0-13.0			
	SS-7	13.0-15.0	X	X	X
	11A/SS-7*	13.0-15.0	X	X	X
B-12	SS-1	1.0-3.0	X	X	X
	SS-2	3.0-5.0			
	SS-3	5.0-7.0	X	X	X
	SS-4	7.0-9.0	X	X	X
	12A/SS-4†	7.0-9.0	X	X	X
	SS-5	9.0-11.0	X	X	X
	SS-6	11.0-13.0			
B-13	SS-1	0.5-2.5			
	SS-2	2.5-4.5			
	SS-3	4.5-6.5	X	X	X
	SS-4	6.5-8.5	X	X	X
	SS-5	8.5-10.5	X	X	X
B-14	SS-1	0.5-2.5			
	SS-2	2.5-4.5			
	SS-3	4.5-6.5	X	X	X
	SS-4	6.5-8.5	X	X	X
	SS-4D*	6.5-8.5	X	X	X
	SS-5	8.5-10.5	X	X	X
B-15	SS-1	0.5-2.5			
	SS-2	2.5-4.5	X	X	X
	SS-2D*	2.5-4.5	X		X
	SS-3	4.5-6.5	X	X	X
	SS-3D*	4.5-6.5		X	
	SS-4	6.5-8.5	X	X	X
	SS-5	8.5-10.5	X	X	X
B-16	SS-1	0.5-2.5			
	SS-2	2.5-4.5			
	SS-3	4.5-6.5	X	X	X
	SS-4	6.5-8.5	X	X	X

Table IV-8
INTERIOR BORING SAMPLE MATRIX
(Continued)

Interior Boring No.	Sample No.	Sample Interval (Ft.)[1]	Chemical Analyses		
			PCBs	VOCs	Semivol.
B-17	SS-1	0.5-2.5			
	SS-2	2.5-4.5			
	SS-3	4.5-6.5	X	X	X
	SS-4	6.5-8.5	X	X	X
	SS-5	8.5-10.5	X	X	X
B-18	SS-1	0.5-2.5			
	SS-2	2.5-4.5			
	SS-3	4.5-6.5	X	X	X
	SS-4	6.5-8.5	X		X
	SS-5	8.5-10.5	X	X	X
	SS-6	10.5-12.5	X	X	X
B-19	SS-1	0.5-2.5			
	SS-2	2.5-4.5			
	SS-3	4.5-6.5	X	X	X
	SS-4	6.5-8.5	X	X	X
	SS-5	8.5-10.5	X	X	X
	SS-6	10.5-12.5	X	X	X
B-20	SS-1	0.5-2.5			
	SS-2	2.5-4.5			
	SS-3	4.5-6.5	X		X
	SS-4	6.5-8.5	X	X	X
	SS-4D*	6.5-8.5	X	X	X
	SS-5	8.5-10.5	X	X	X
	SS-6	10.5-12.5			
B-21	SS-1	0.5-2.5			
	SS-2	2.5-4.5	X	X	X
	SS-3	4.5-6.5	X	X	X
	SS-4	6.5-8.5	X	X	X

[1]*All samples taken by split-spoon samplers except for Interior Borings B-3, B-9 and B-10 which were sampled with a manual bucket auger.*

**Replicate sample.*

†*Replicate sample submitted to EPA.*

FIGURES

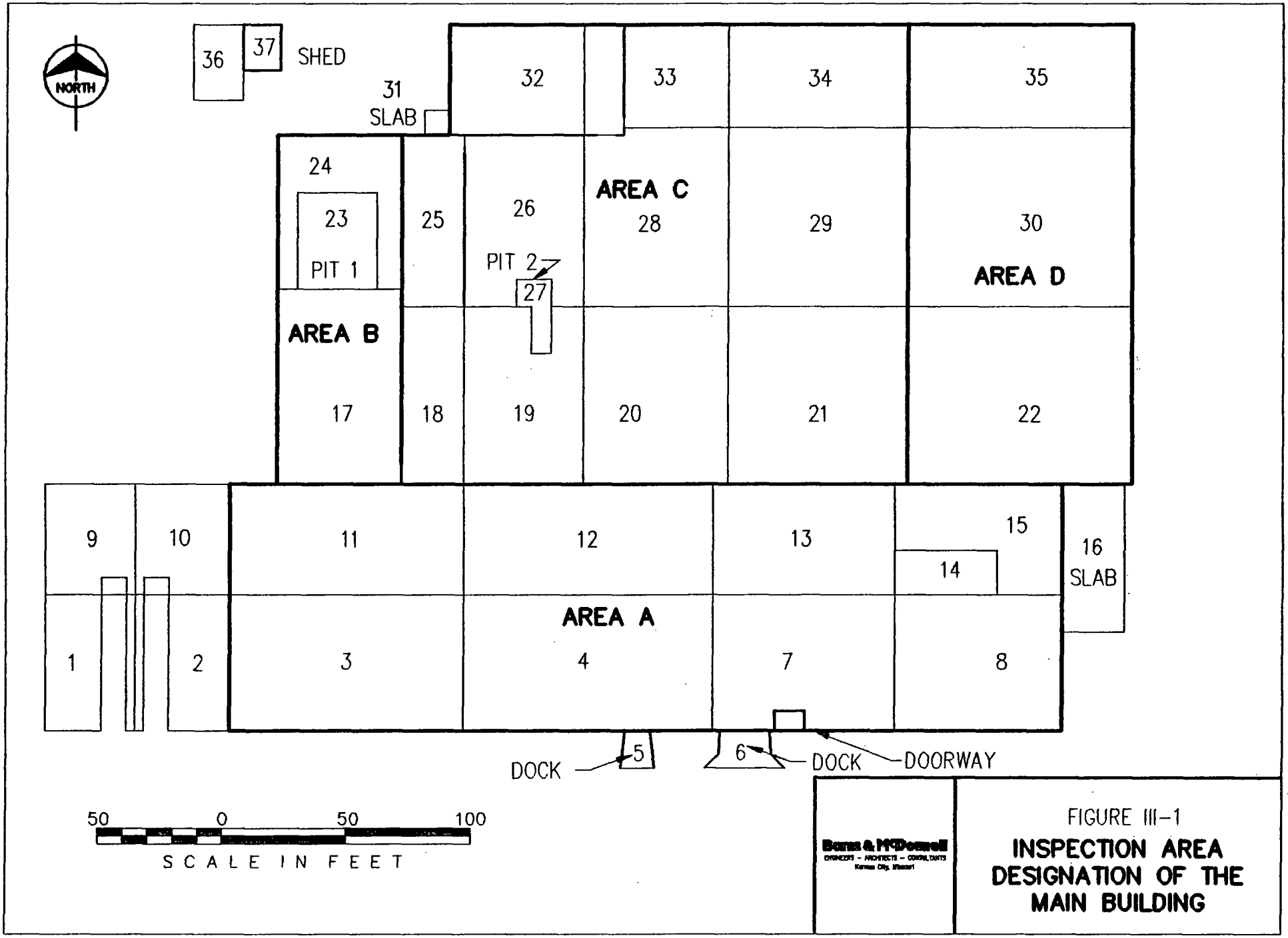
NORTH
36
37
SHED
31
SLAB
32
33
34
35
24
23
PIT 1
25
26
PIT 2
27
AREA C
28
29
30
AREA D
AREA B
17
18
19
20
21
22
9
10
11
12
13
15
14
16
SLAB
AREA A
1
2
3
4
7
8
DOCK
5
6
DOCK
DOORWAY
50
0
50
100
SCALE IN FEET
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FIGURE III-1
INSPECTION AREA DESIGNATION OF THE MAIN BUILDING
FIGIII-1 6-19-89

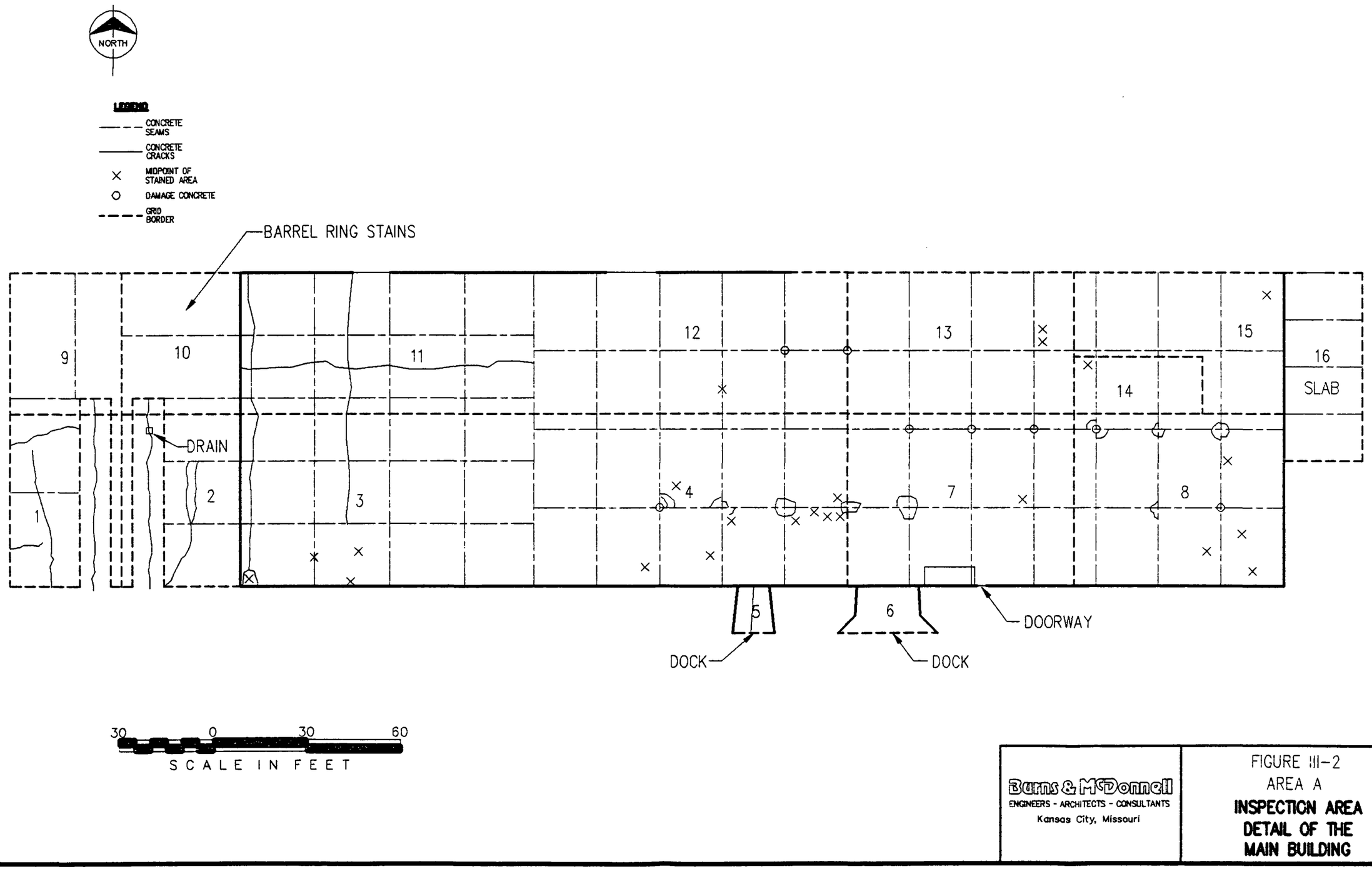

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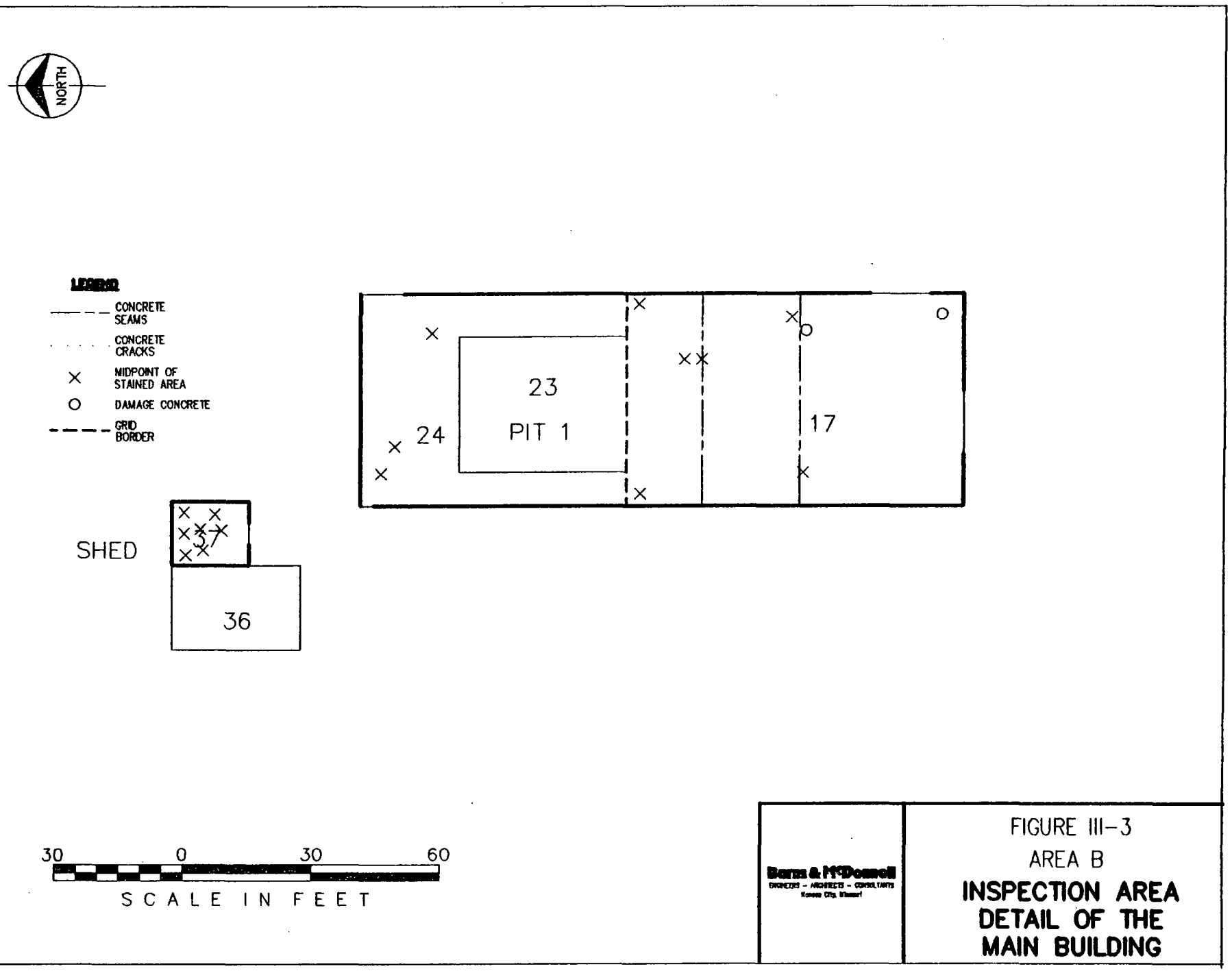
FIGURE III-2
AREA A
INSPECTION AREA DETAIL OF THE MAIN BUILDING

AREA-A.DWG 01-26-1990 10:16



AREA-B: 1-26-90

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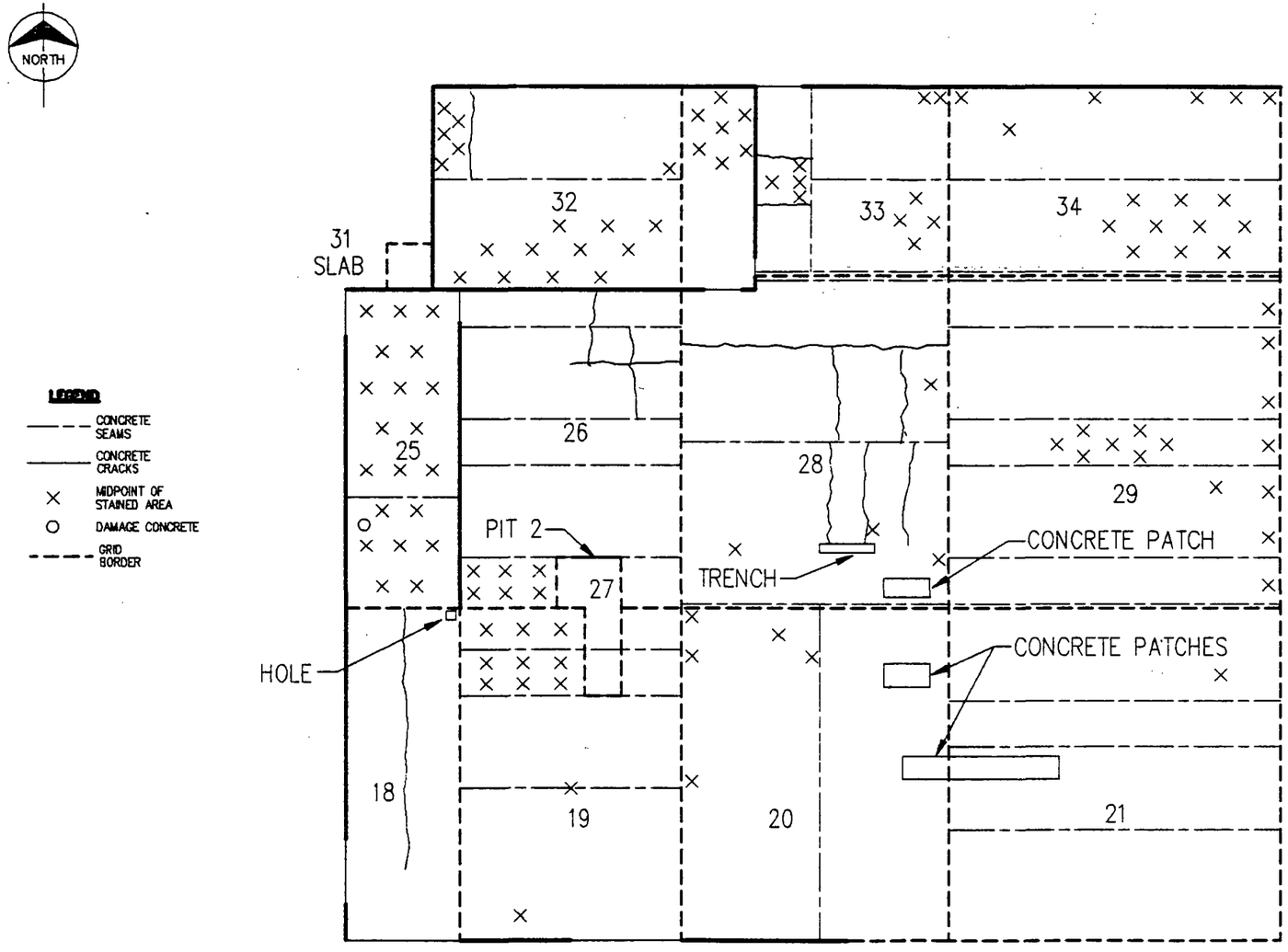
Kansas City, Missouri

FIGURE III-3
AREA B
INSPECTION AREA DETAIL OF THE MAIN BUILDING



AREA-C.DWG 01-26-1990 10:21

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FIGURE III-4
AREA C
INSPECTION AREA DETAIL OF THE MAIN BUILDING

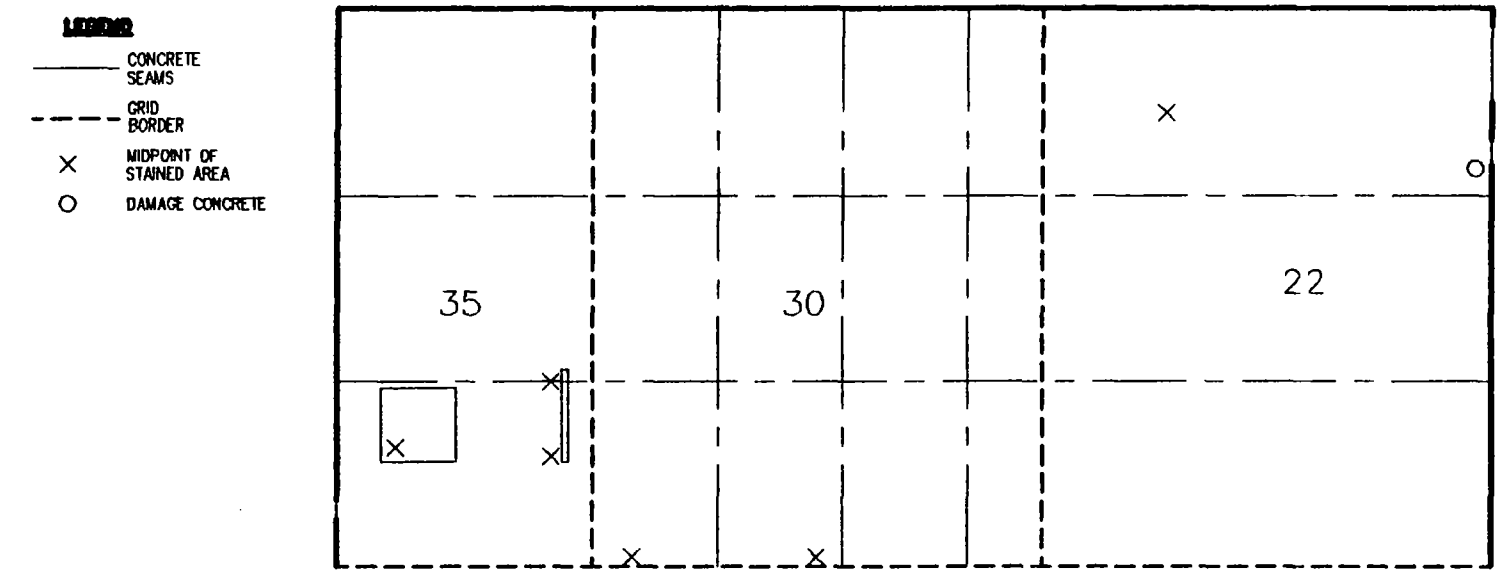

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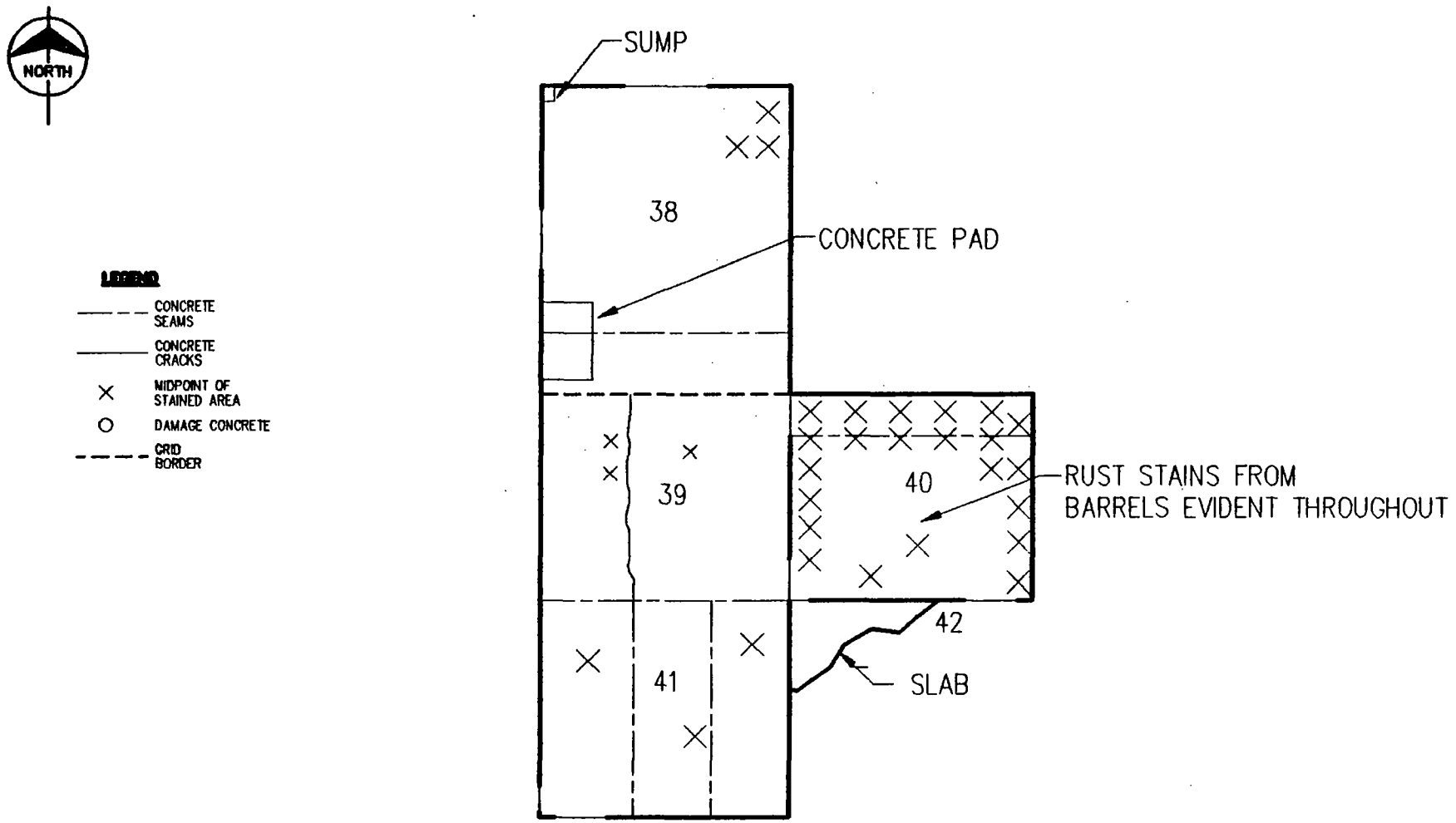
FIGURE III-5
AREA D
INSPECTION AREA DETAIL OF THE MAIN BUILDING

AREA-D: 1-26-90



WAREHSE: 5/14/89

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FIGURE III-6

INSPECTION AREA DETAIL OF SOUTH WAREHOUSE

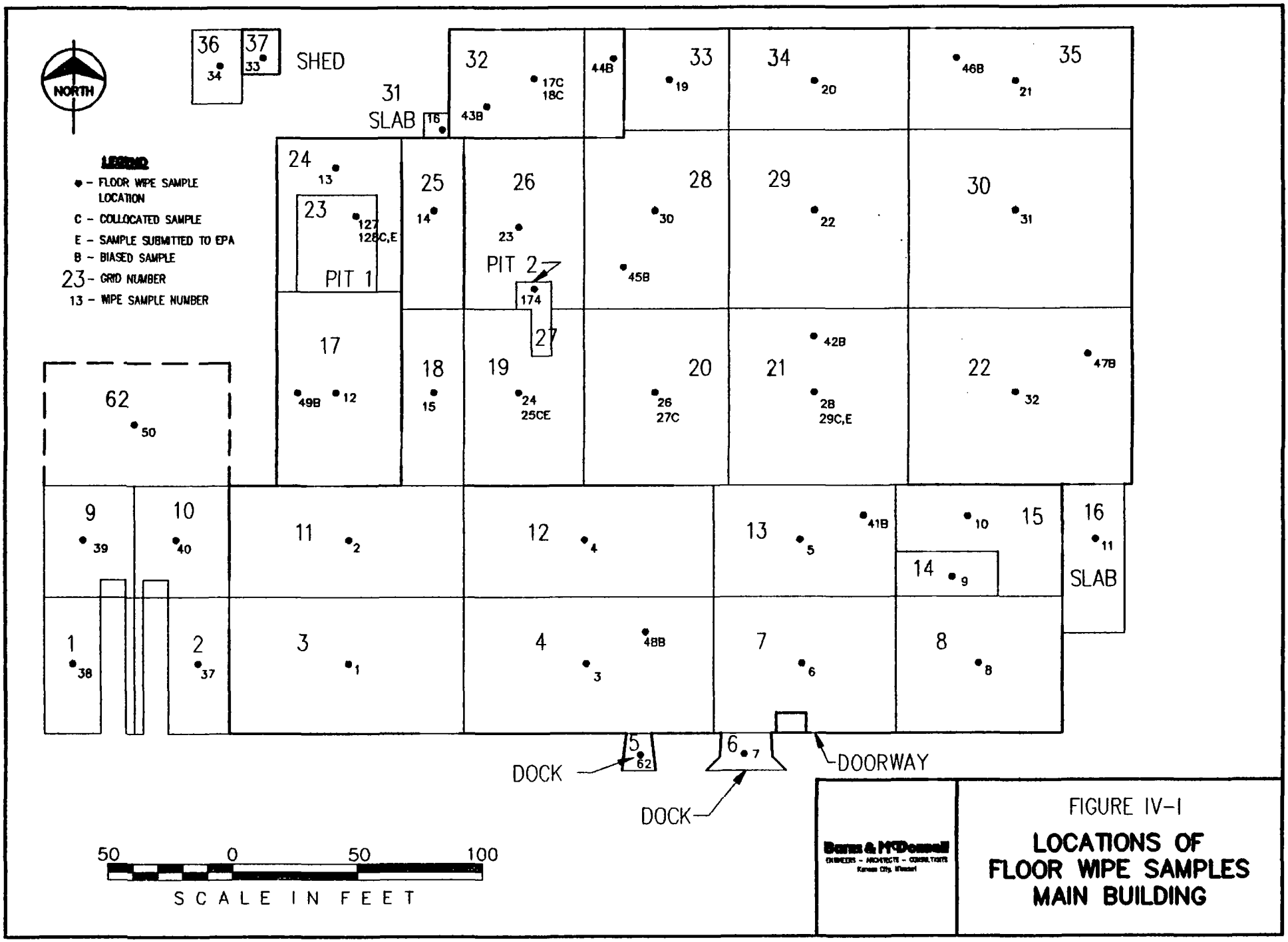
NORTH
LEGEND
• - FLOOR WIPE SAMPLE LOCATION
C - COLLOCATED SAMPLE
E - SAMPLE SUBMITTED TO EPA
B - BIASED SAMPLE
23 - GRID NUMBER
13 - WIPE SAMPLE NUMBER
SHED
SLAB
PIT 1
PIT 2
DOCK
DOCK
DOORWAY
SLAB
SCALE IN FEET
50 0 50 100
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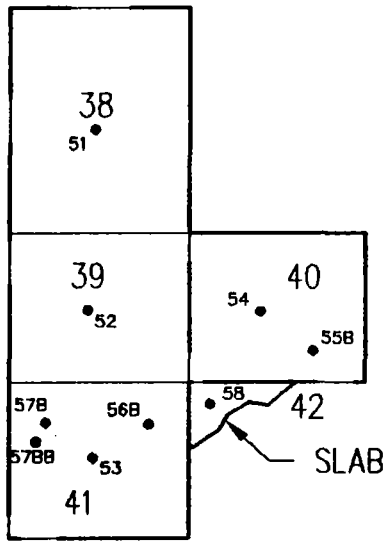
FIGURE IV-1
LOCATIONS OF FLOOR WIPE SAMPLES MAIN BUILDING

FIG4-1: 5/11/89

LEGEND

- ● - FLOOR WIPE SAMPLE LOCATION
- C - COLLOCATED SAMPLE
- CE - COLLOCATED SAMPLE FOR EPA
- B - BIASED SAMPLE
- 23 - GRID NUMBER
- 13 - WIPE SAMPLE NUMBER



SOUTH WAREHOUSE

Burns & McDonnell

FIGURE IV-2

LOCATIONS OF FLOOR WIPE SAMPLES SOUTH WAREHOUSE

FIG401 7-28-89

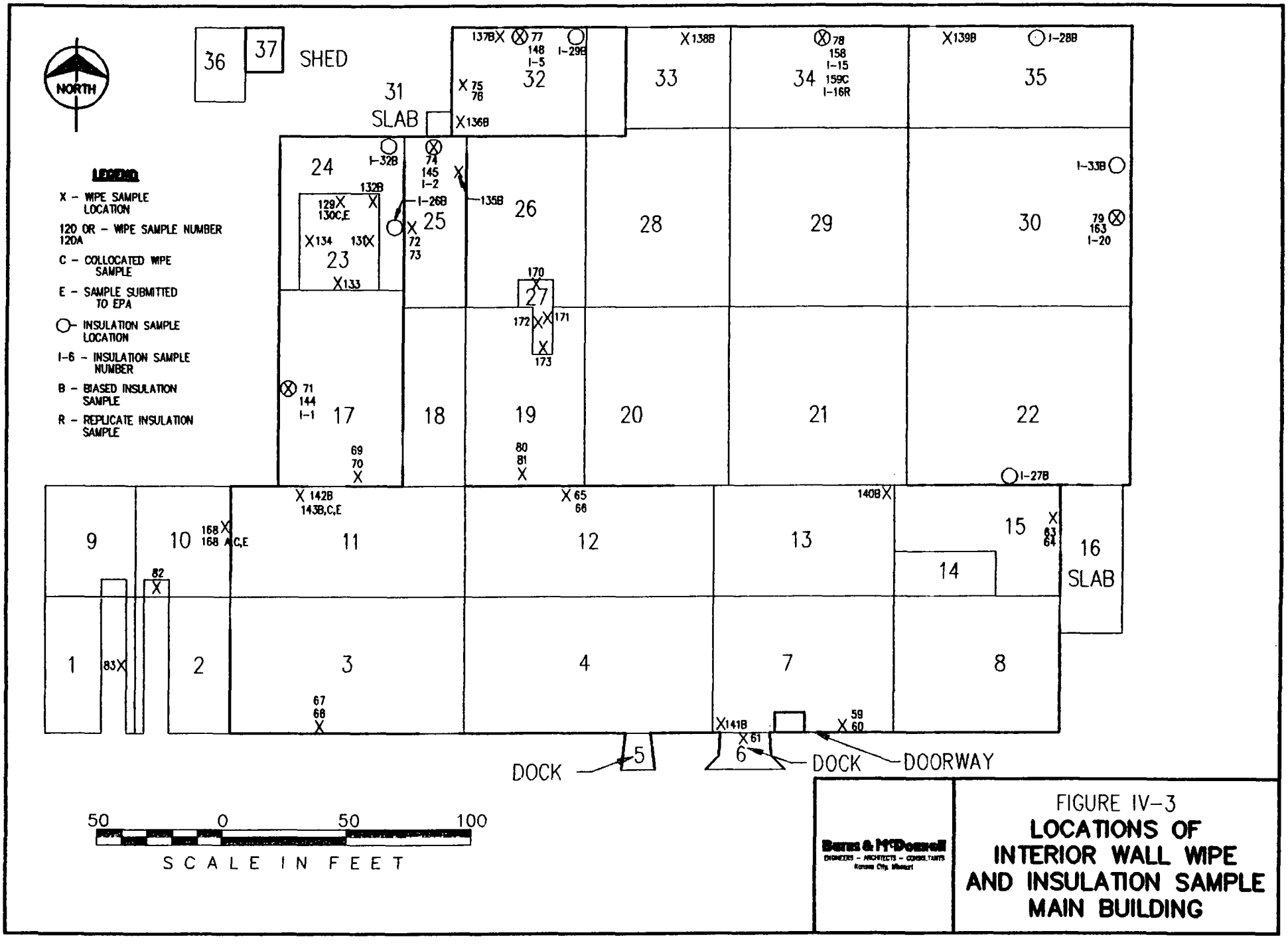


FIG4-3: 1/26/90

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Kansas City, Missouri

FIGURE IV-3
LOCATIONS OF INTERIOR WALL WIPE AND INSULATION SAMPLE MAIN BUILDING

LEGEND

X – WIPE SAMPLE LOCATION

120 – WIPE SAMPLE NUMBER

C – COLLOCATED WIPE SAMPLE

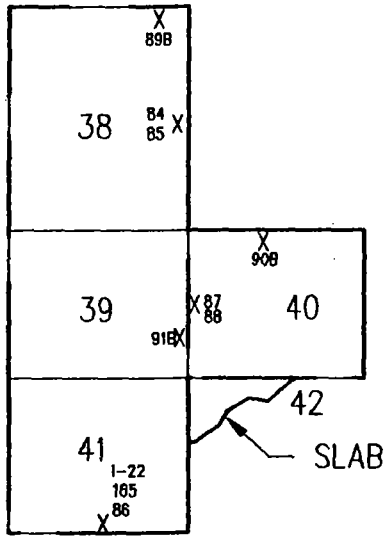
E – SAMPLE SUBMITTED TO EPA

○– INSULATION SAMPLE LOCATION

I-6 – INSULATION SAMPLE NUMBER

B – BIASED INSULATION SAMPLE

R – REPLICATE INSULATION SAMPLE



SOUTH WAREHOUSE

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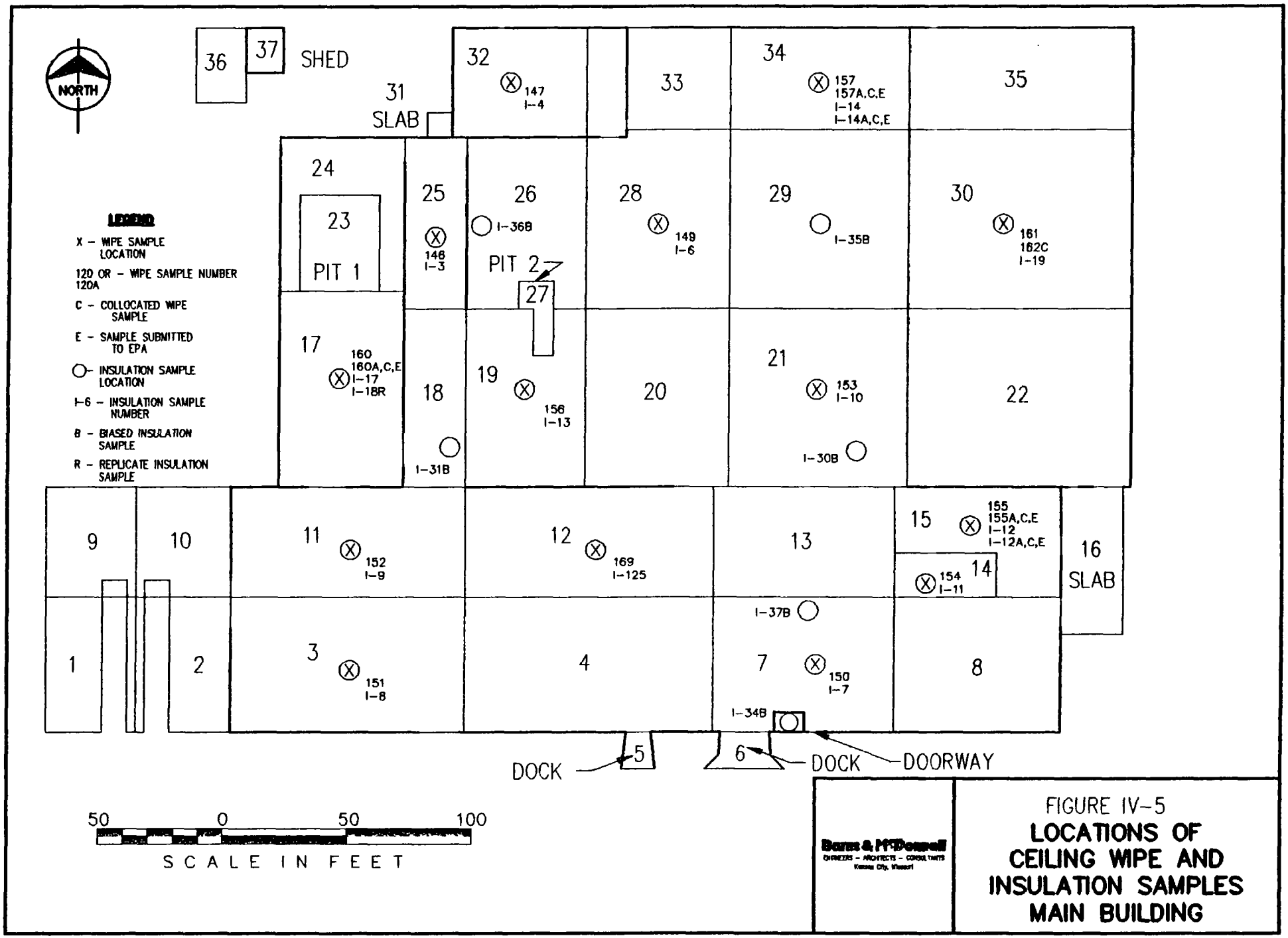
Kansas City, Missouri

FIGURE IV-4
LOCATIONS OF INTERIOR WALL WIPE AND INSULATION SAMPLES SOUTH WAREHOUSE

FIG404: 5/15/89


NORTH
36
37
SHED
31
SLAB
32
147
I-4
33
34
157
157A,C,E
I-14
I-14A,C,E
35
24
23
PIT 1
25
146
I-3
26
I-36B
PIT 2
27
28
149
I-6
29
I-35B
30
161
162C
I-19
17
160
160A,C,E
I-17
I-18R
18
I-31B
19
156
I-13
20
21
153
I-10
I-30B
22
9
10
11
152
I-9
12
169
I-125
13
15
155
155A,C,E
I-12
I-12A,C,E
154
I-11
14
16
SLAB
I-37B
1
2
3
151
I-8
4
7
150
I-7
I-34B
8
DOCK
5
6
DOCK
DOORWAY
LEGEND
X - WIPE SAMPLE LOCATION
120 OR 120A - WIPE SAMPLE NUMBER
C - COLLOCATED WIPE SAMPLE
E - SAMPLE SUBMITTED TO EPA
INSULATION SAMPLE LOCATION
I-6 - INSULATION SAMPLE NUMBER
B - BIASED INSULATION SAMPLE
R - REPLICATE INSULATION SAMPLE
50
0
50
100
SCALE IN FEET
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Kansas City, Missouri
FIGURE IV-5
LOCATIONS OF CEILING WIPE AND INSULATION SAMPLES MAIN BUILDING

FIG4-5: 1/26/90

LEGEND

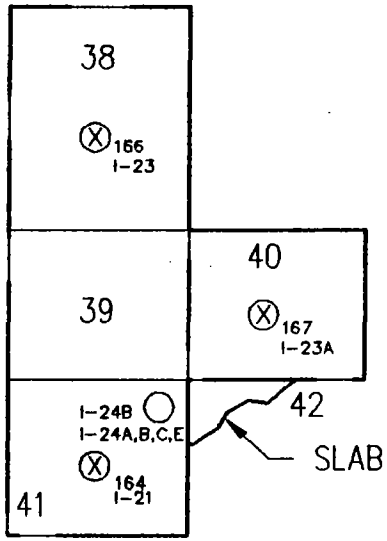
X – WIPE SAMPLE LOCATION

120 OR 120A – WIPE SAMPLE NUMBER

○ – INSULATION SAMPLE LOCATION

I–6 – INSULATION SAMPLE NUMBER

B – BIASED INSULATION SAMPLE



SOUTH WAREHOUSE

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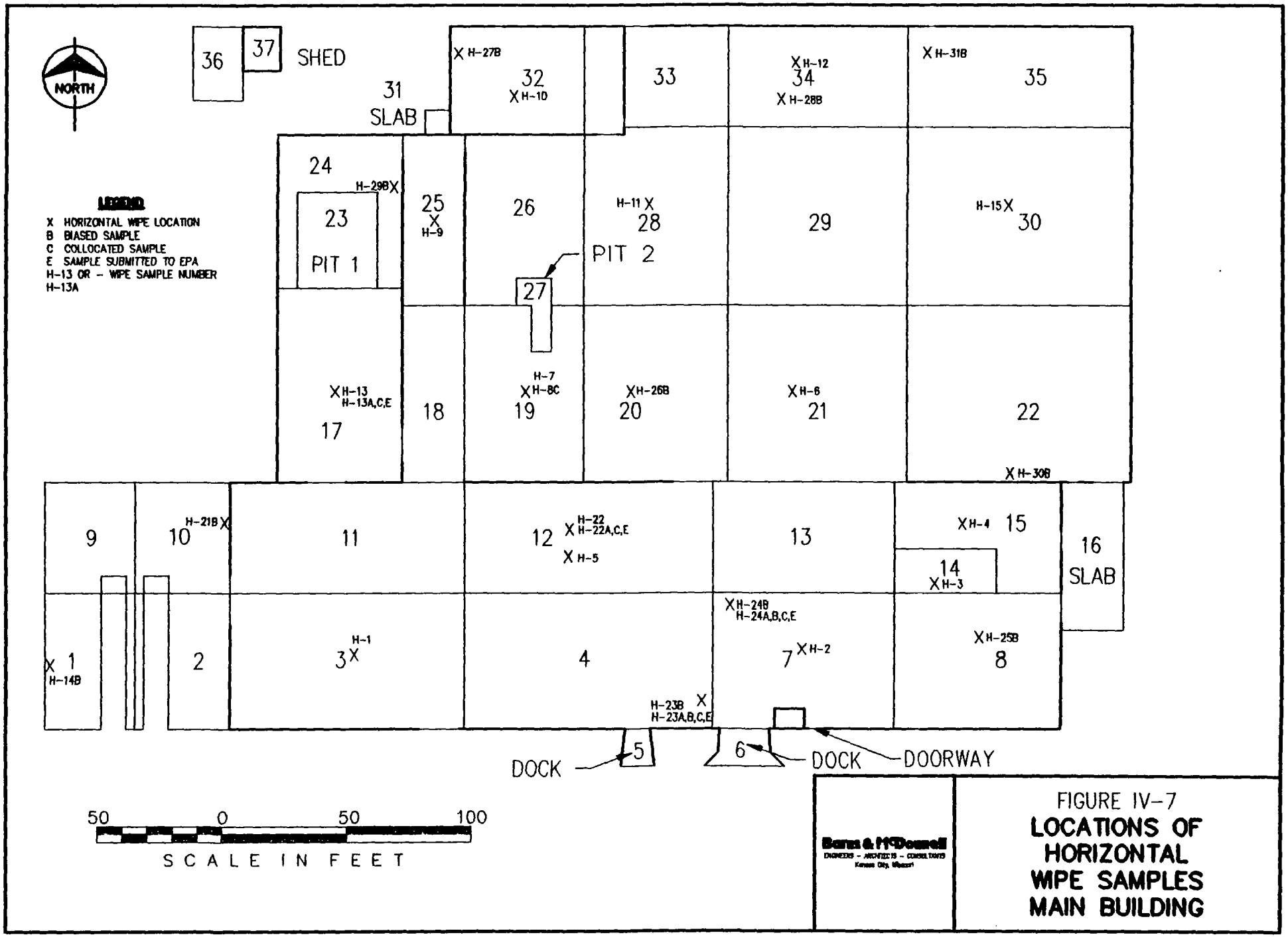
FIGURE IV–6

LOCATIONS OF CEILING WIPE AND INSULATION SAMPLES SOUTH WAREHOUSE

FIG4–6: 1/26/90


NORTH
LEGEND
X HORIZONTAL WIPE LOCATION
B BIASED SAMPLE
C COLLOCATED SAMPLE
E SAMPLE SUBMITTED TO EPA
H-13 OR - WIPE SAMPLE NUMBER
H-13A
36
37
SHED
31
SLAB
H-27B
32
H-10
33
H-12
34
H-28B
H-31B
35
24
H-29B
23
PIT 1
25
H-9
26
H-11
28
PIT 2
29
H-15
30
27
H-13
H-13A,C,E
17
18
H-7
H-8C
19
H-26B
20
H-6
21
22
H-30B
9
10
H-21B
11
12
H-22
H-22A,C,E
H-5
13
H-4
15
14
H-3
16
SLAB
1
H-14B
2
H-1
3
4
H-24B
H-24A,B,C,E
7
H-2
H-25B
8
H-23B
H-23A,B,C,E
5
6
DOCK
DOCK
DOORWAY
50
0
50
100
SCALE IN FEET
Burns & McDonnell
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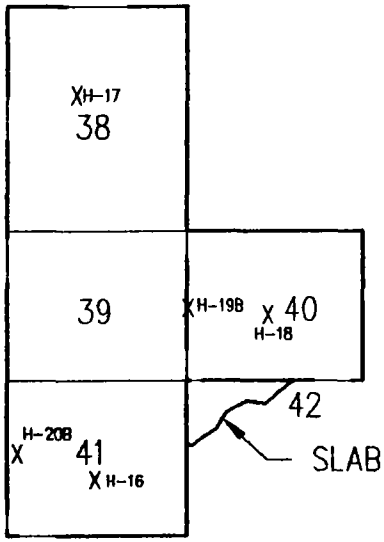
Kansas City, Missouri
FIGURE IV-7
LOCATIONS OF HORIZONTAL WIPE SAMPLES MAIN BUILDING

FIG4-7: 1/26/90

LEGEND

X HORIZONTAL WIPE LOCATION
B BIASED SAMPLE
H-13 WIPE SAMPLE NUMBER



SOUTH WAREHOUSE

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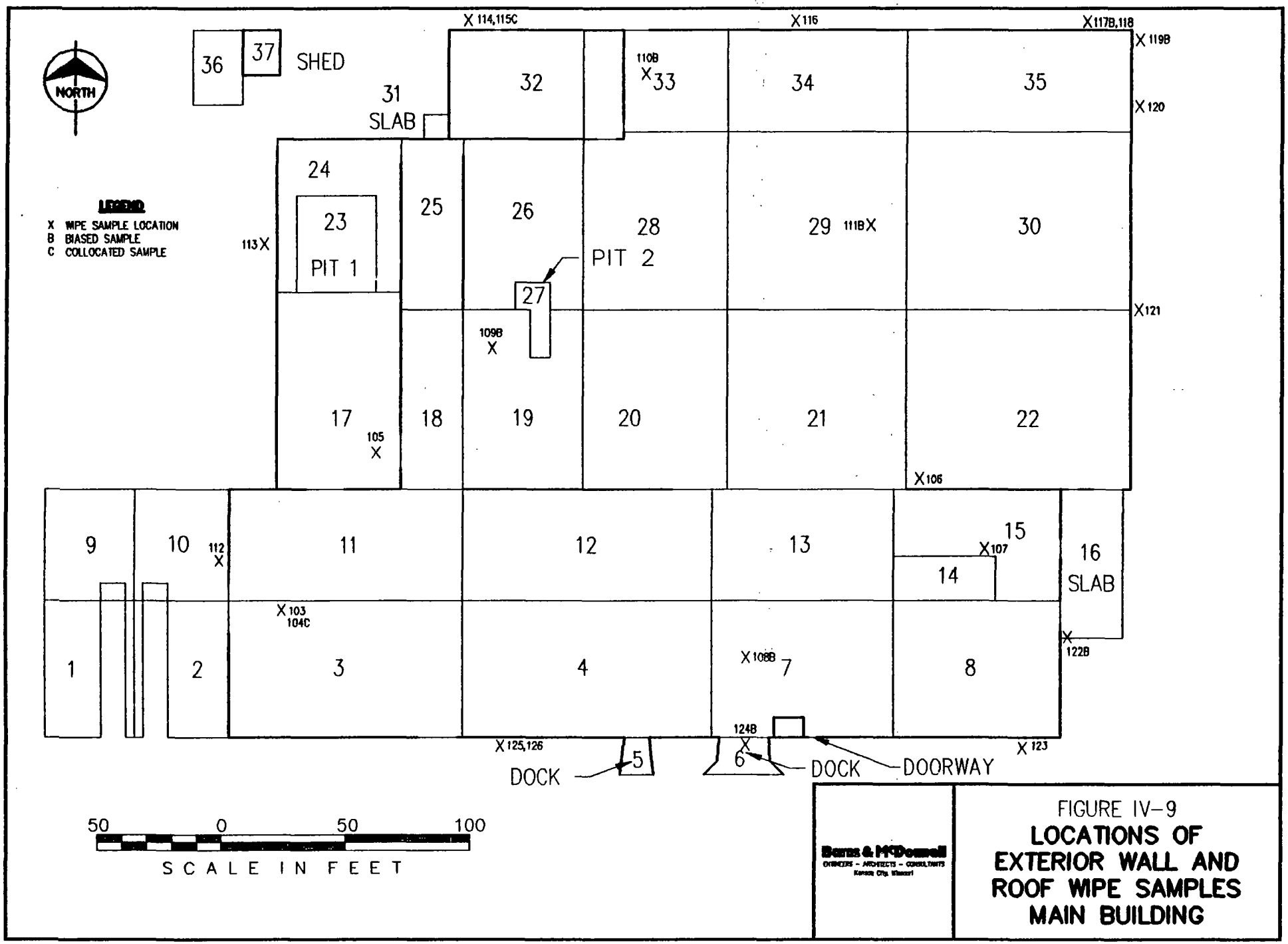
Kansas City, Missouri

FIGURE IV-8
LOCATIONS OF HORIZONTAL WIPE SAMPLES SOUTH WAREHOUSE

FIG408: 4/11/89


NORTH
LEGEND
X WIPE SAMPLE LOCATION
B BIASED SAMPLE
C COLLOCATED SAMPLE
36
37
SHED
31
SLAB
32
33
34
35
24
23
PIT 1
25
26
27
PIT 2
28
29
30
17
18
19
20
21
22
9
10
11
12
13
14
15
16
SLAB
1
2
3
4
5
6
7
8
DOCK
DOCK
DOORWAY
X 114,115C
X 116
X 117B,118
X 119B
X 120
X 121
X 122B
X 123
X 124B
X 125,126
X 106
X 107
X 108B
X 109B
X 110B
X 111B
X 112
X 113
X 103
104C
X 105
50 0 50 100
SCALE IN FEET
Burns & McDonnell
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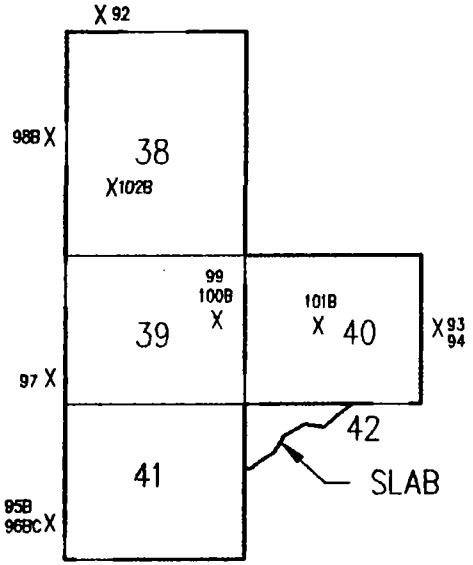
Kansas City, Missouri
FIGURE IV-9
LOCATIONS OF EXTERIOR WALL AND ROOF WIPE SAMPLES MAIN BUILDING
FIG4-9: 4/11/89

LEGEND

X WIPE SAMPLE LOCATION
B BIASED SAMPLE
C COLLOCATED SAMPLE
113 WIPE SAMPLE NUMBER



SOUTH WAREHOUSE

Burns & McDonnell
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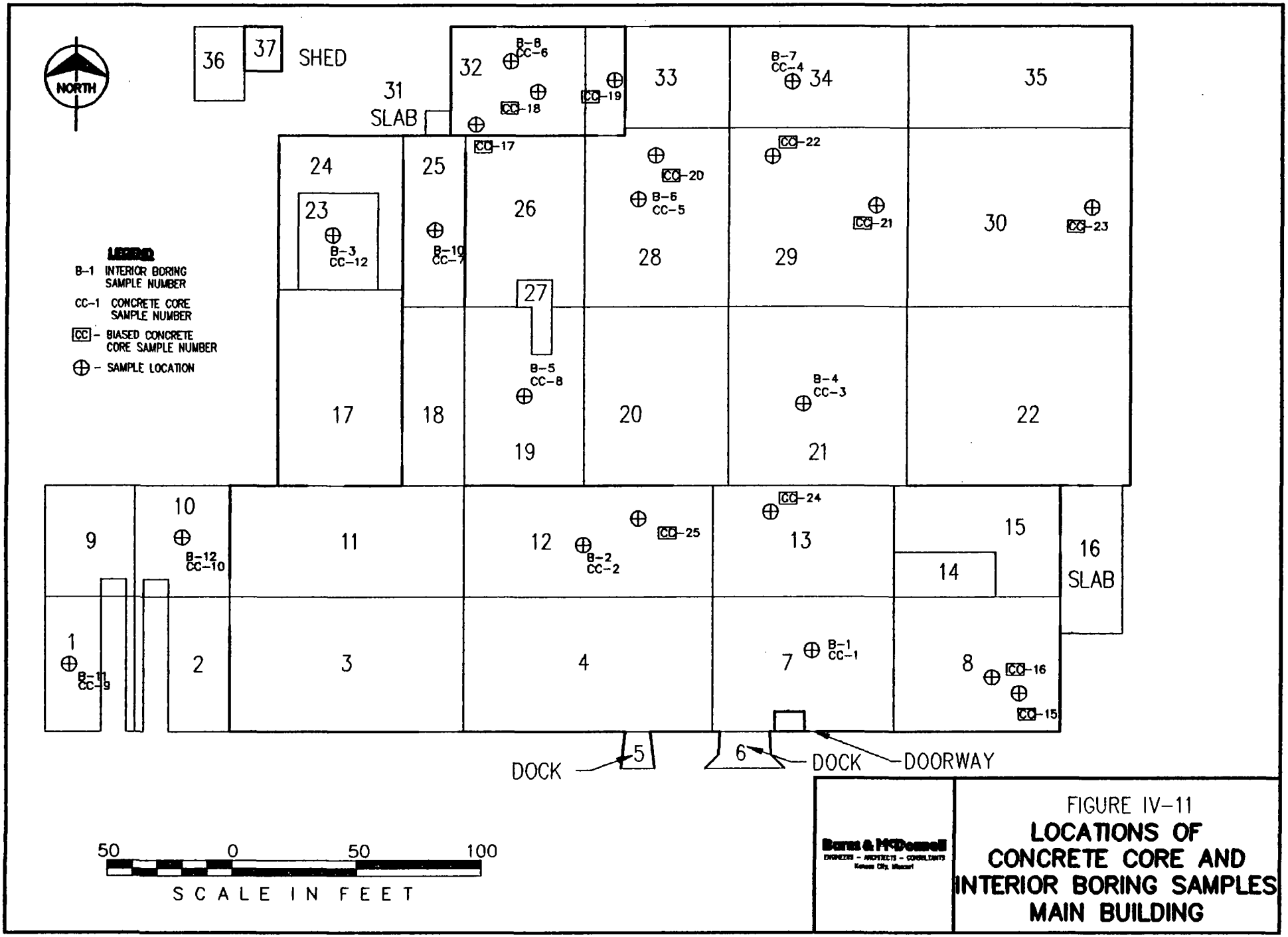
Kansas City, Missouri

FIGURE IV-10
LOCATIONS OF EXTERIOR WALL AND ROOF WIPE SAMPLES SOUTH WAREHOUSE

FIG410: 4/11/89



Burns & McDonnell
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Kansas City, Missouri

FIGURE IV-11

LOCATIONS OF CONCRETE CORE AND INTERIOR BORING SAMPLES MAIN BUILDING

FIG411: 5/11/89

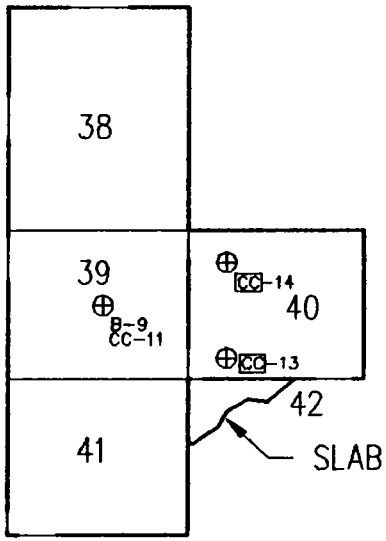
LEGEND

B-1 INTERIOR BORING SAMPLE NUMBER

CC-1 CONCRETE CORE SAMPLE NUMBER

[CC] - BIASED CONCRETE CORE SAMPLE NUMBER

⊕ - SAMPLE LOCATION



SOUTH WAREHOUSE

Burns & McDonnell
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Kansas City, Missouri

FIGURE IV-12
LOCATIONS OF CONCRETE CORE AND INTERIOR BORING SAMPLES SOUTH WAREHOUSE

FIG412: 4/11/89

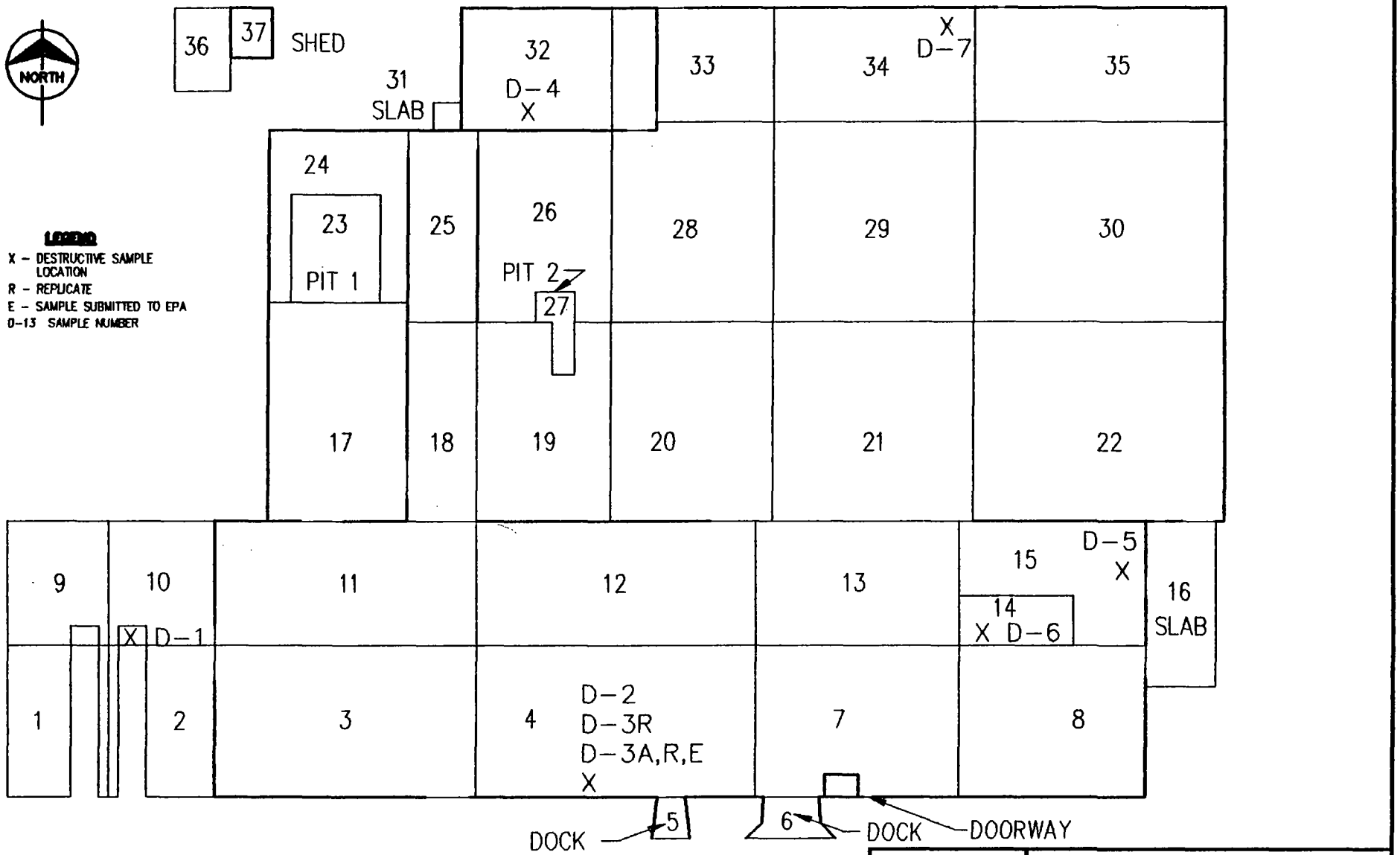
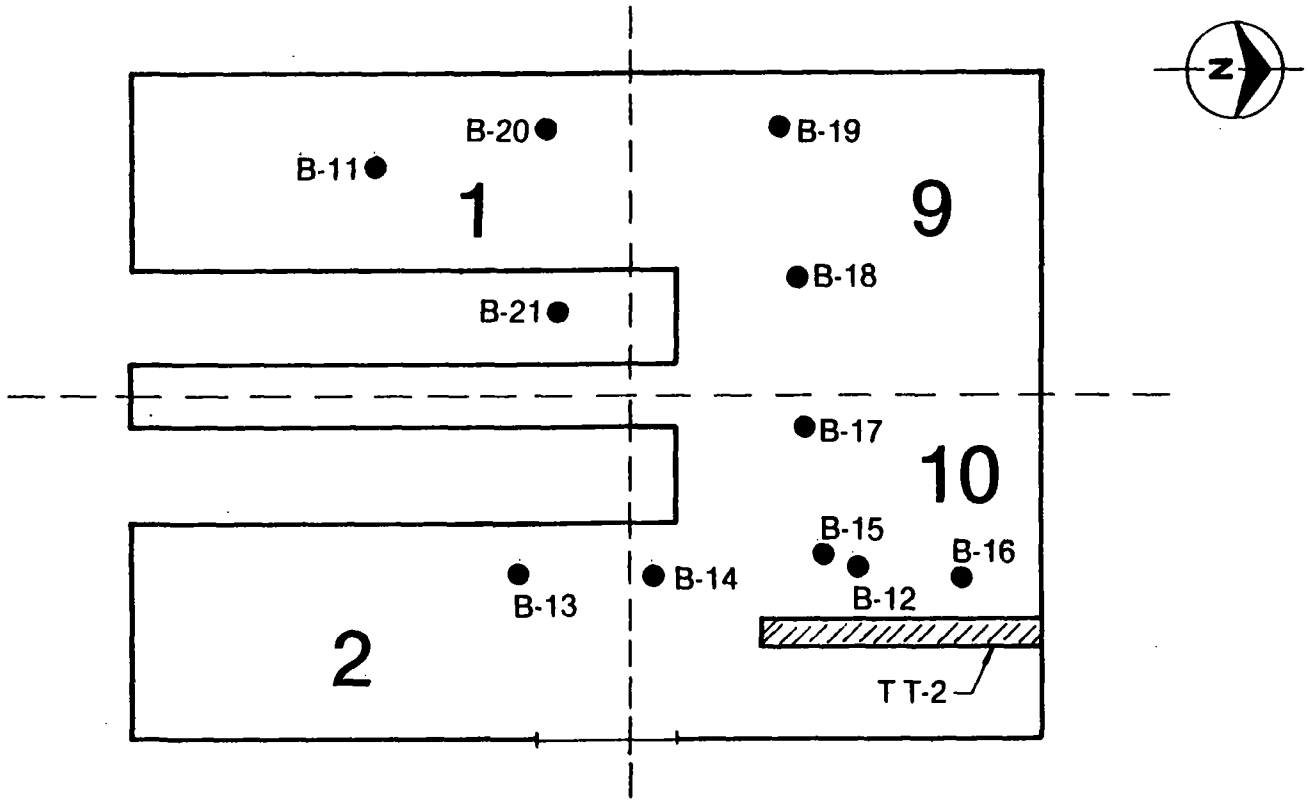


FIGURE IV-13

LOCATIONS OF DESTRUCTIVE SAMPLES MAIN BUILDING

FIG415: 5/11/89



LEGEND

Test trench location

Boring location

1 Grid Number

20' 0' 20' 40'

GRAPHIC SCALE 1"=20'

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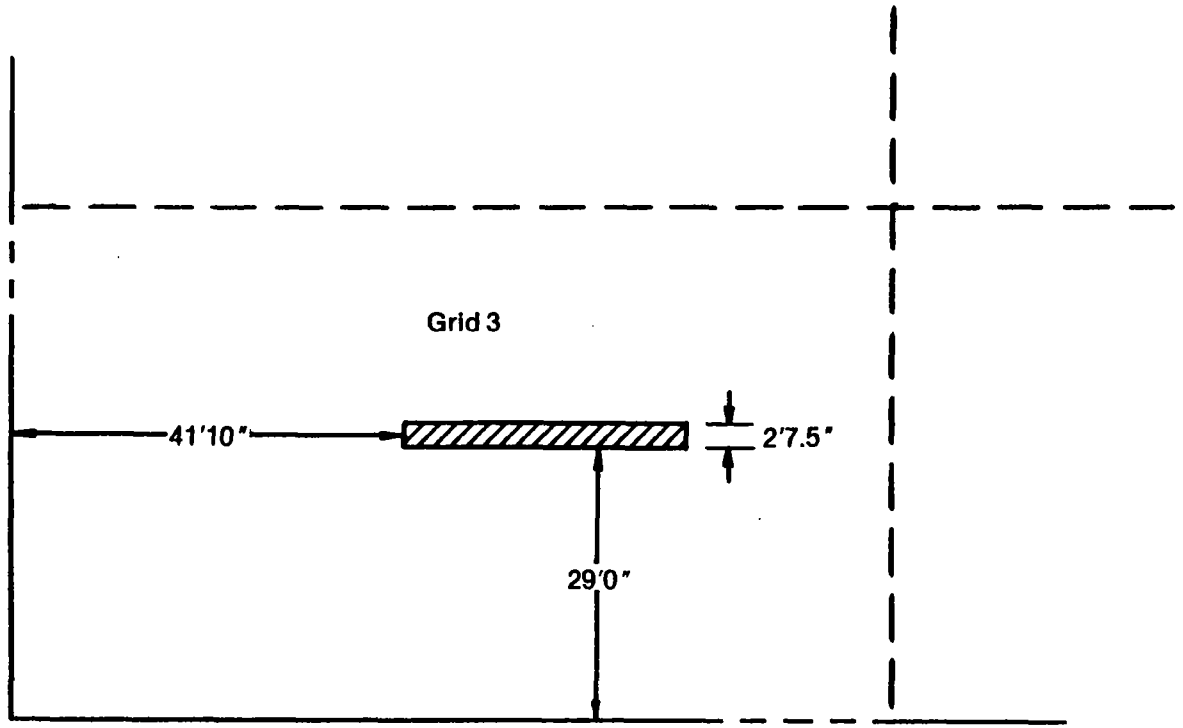
Kansas City, Missouri

Figure IV-14

SOIL BORING & TEST TRENCH LOCATION PLAN, LOADING DOCK-MAIN BUILDING



Legend

Test Trench

20 0 20 40

SCALE IN FEET

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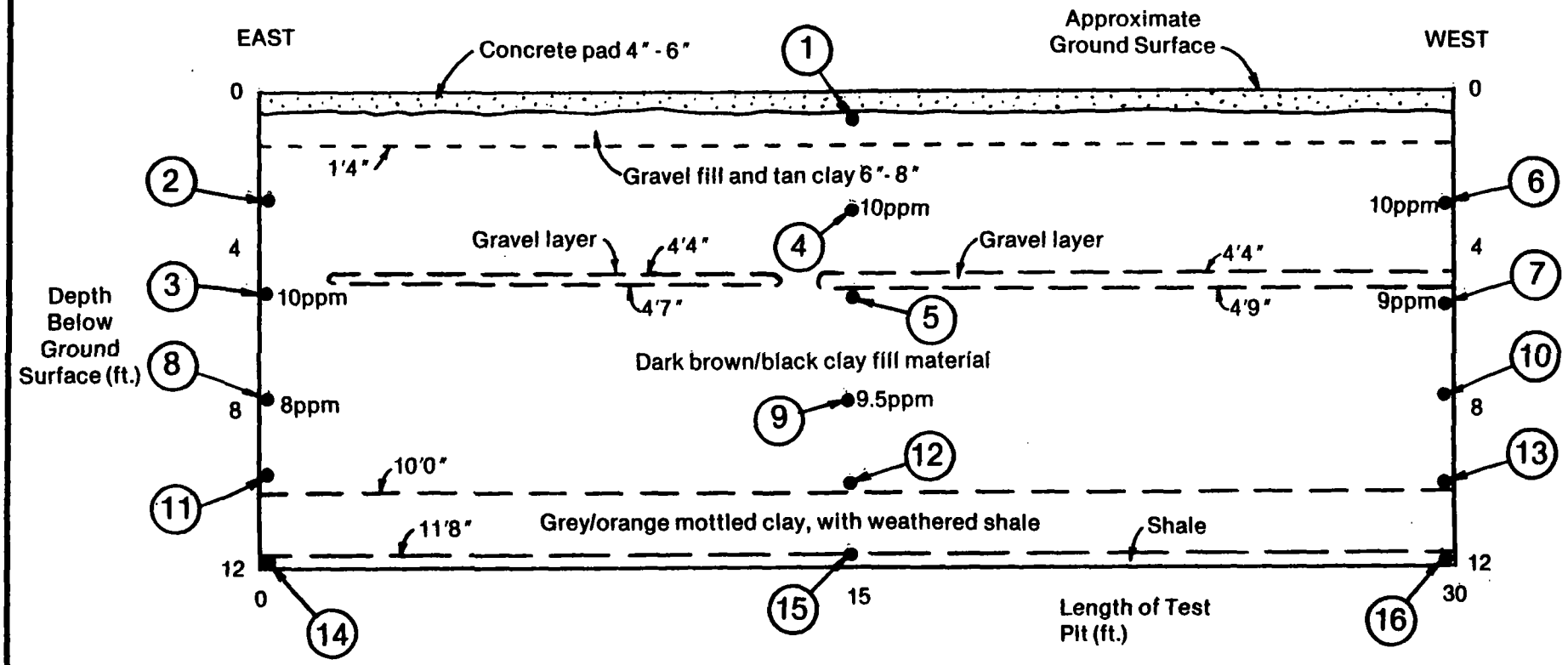
Kansas City, Missouri

Figure IV-15

LOCATION OF TEST TRENCH MAIN BUILDING



LEGEND

10 ppm — Hnu Reading During Excavation

(1) — Sample Location

VERT. 4 2 0 4 8 SCALE IN FEET

HORIZ. 4 2 0 4 8 SCALE IN FEET

EMPLOYEE - OWNED
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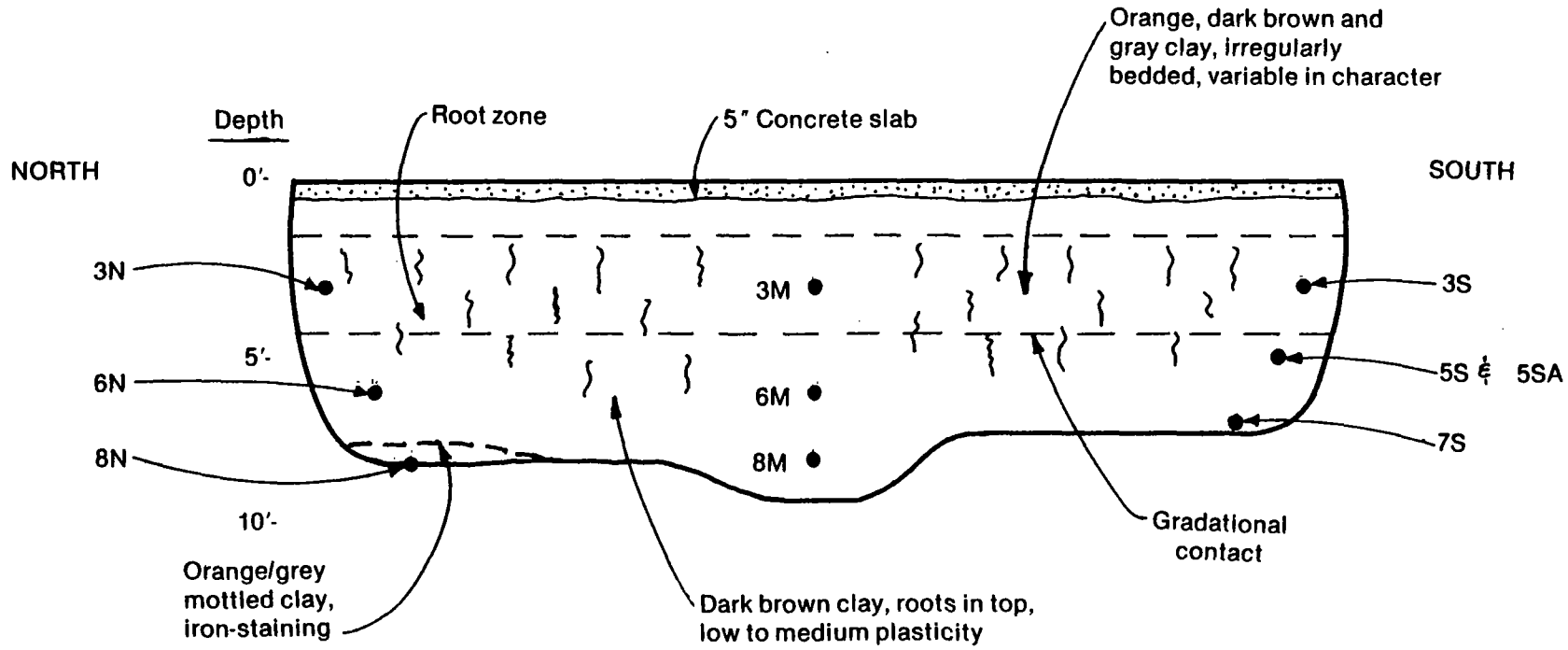
Kansas City Missouri

Figure IV-16
TEST TRENCH TT-1
SOIL PROFILE



LEGEND

3N — Sample Location

⟆⟆⟆ — Roots

VERT. 5 0 5 10 SCALE IN FEET

HORIZ. 5 0 5 10 SCALE IN FEET

Note: T.I.P. Readings ranged from 0 to 2 ppm.

EMPLOYEE-OWNED
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Figure IV-17
TEST TRENCH
TT-2
SOIL PROFILE

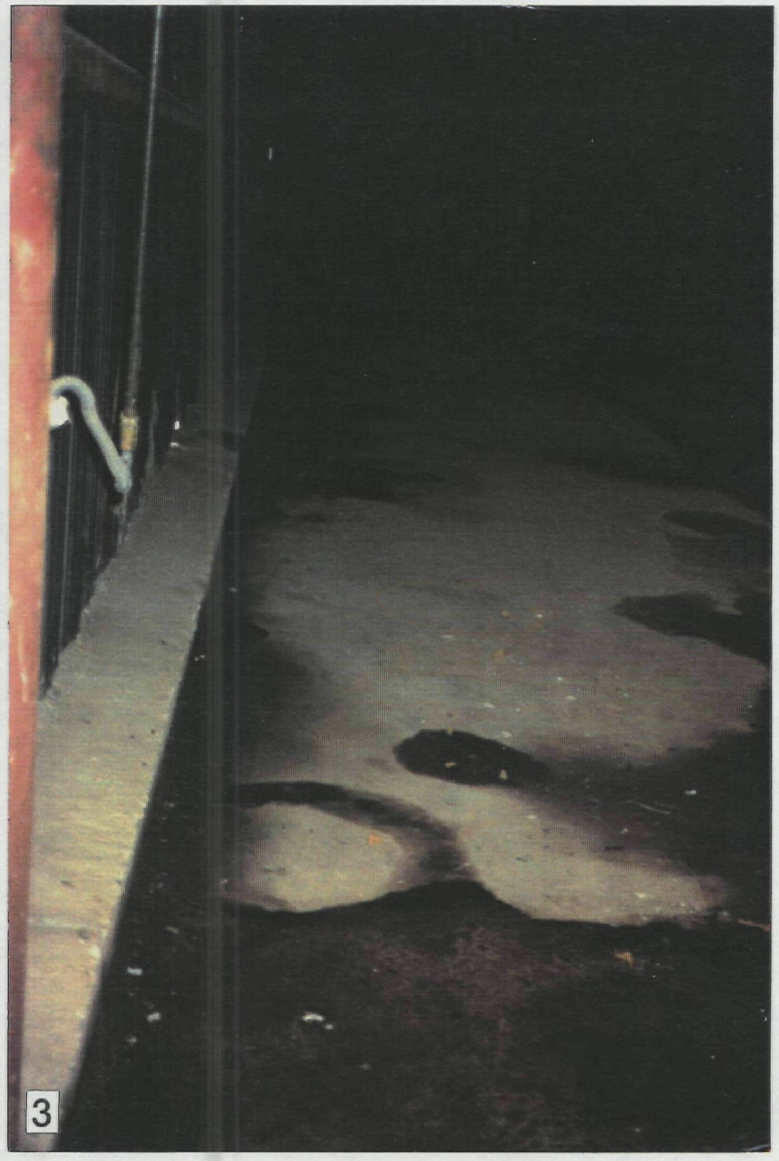
APPENDIX A - PHOTOGRAPHS

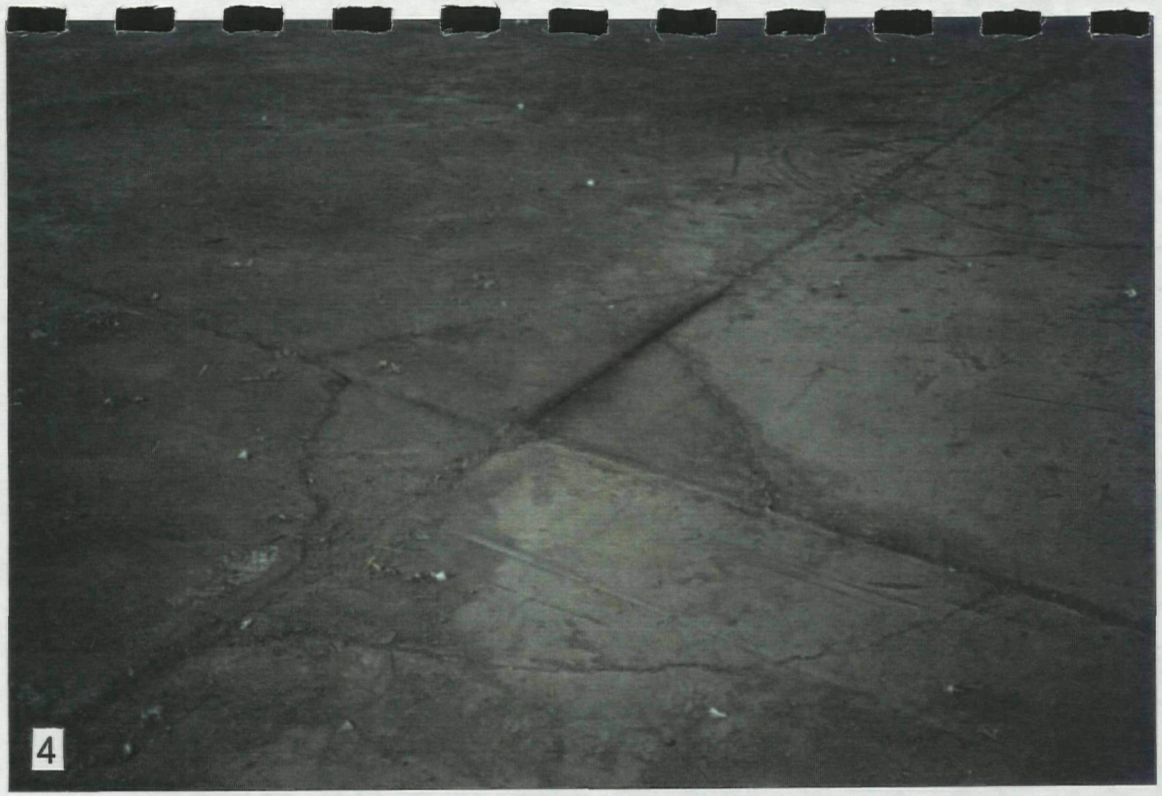
Rose Chemicals Site
Photographic Log of Major Findings
Buildings Inspection

Photo No.	Description
1	Stained area in northwest corner of Grid 40, South Warehouse.
2	Rust rings from barrels, near middle of Grid 2, Main Building.
3	Stained area along north wall of Grid 40, South Warehouse.
4	Cracks at concrete seam intersection in Grid 3, Main Building.
5	Drain in ground level area of Grid 2, Main Building.
6	Crack in concrete extending across Grid 11, Main Building, looking east.
7	Stain in northeast corner of Grid 33, Main Building.
8	Stain in Grid 33 with water "beading" on the surface Main Building.
9	Sump in northwest corner in Grid 38, South Warehouse
10	Remaining linoleum floor covering in Grid 14, Main Building.
11	Stained area near open trench in Grid 28, Main Building
12	Stained area along concrete seams on south wall of Grid 32, Main Building.

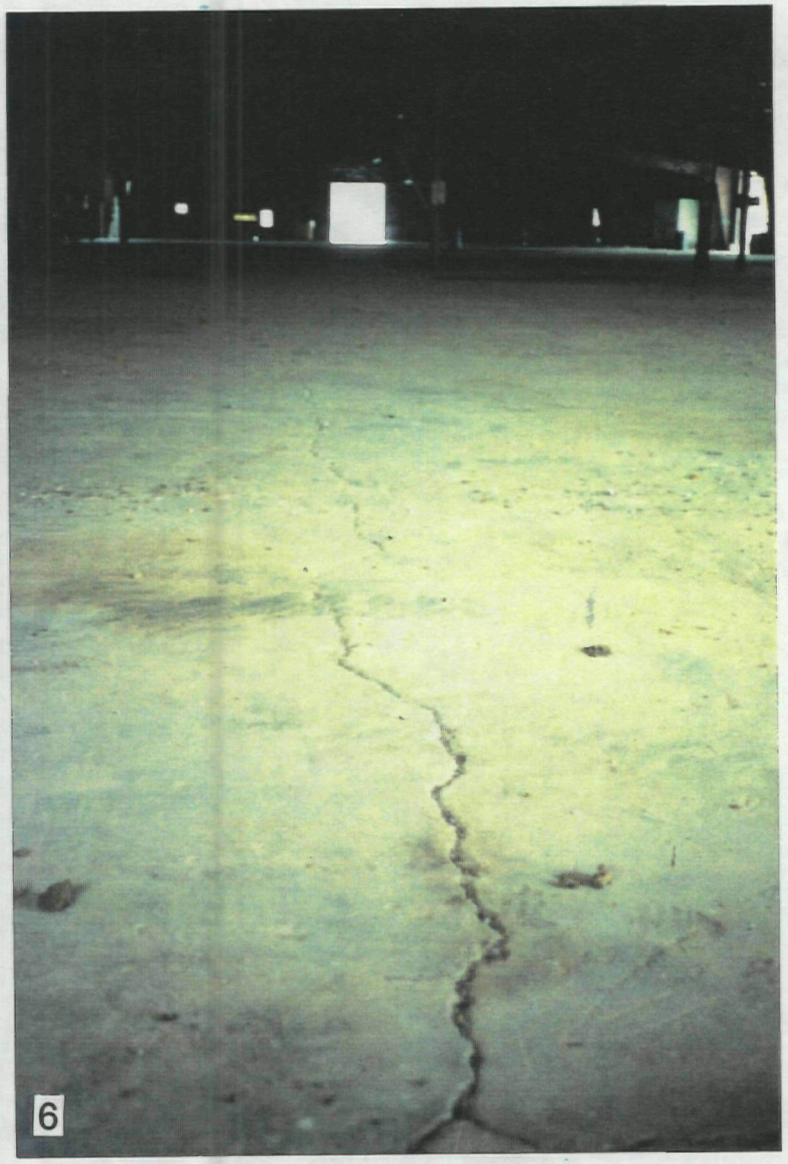

1


2


3

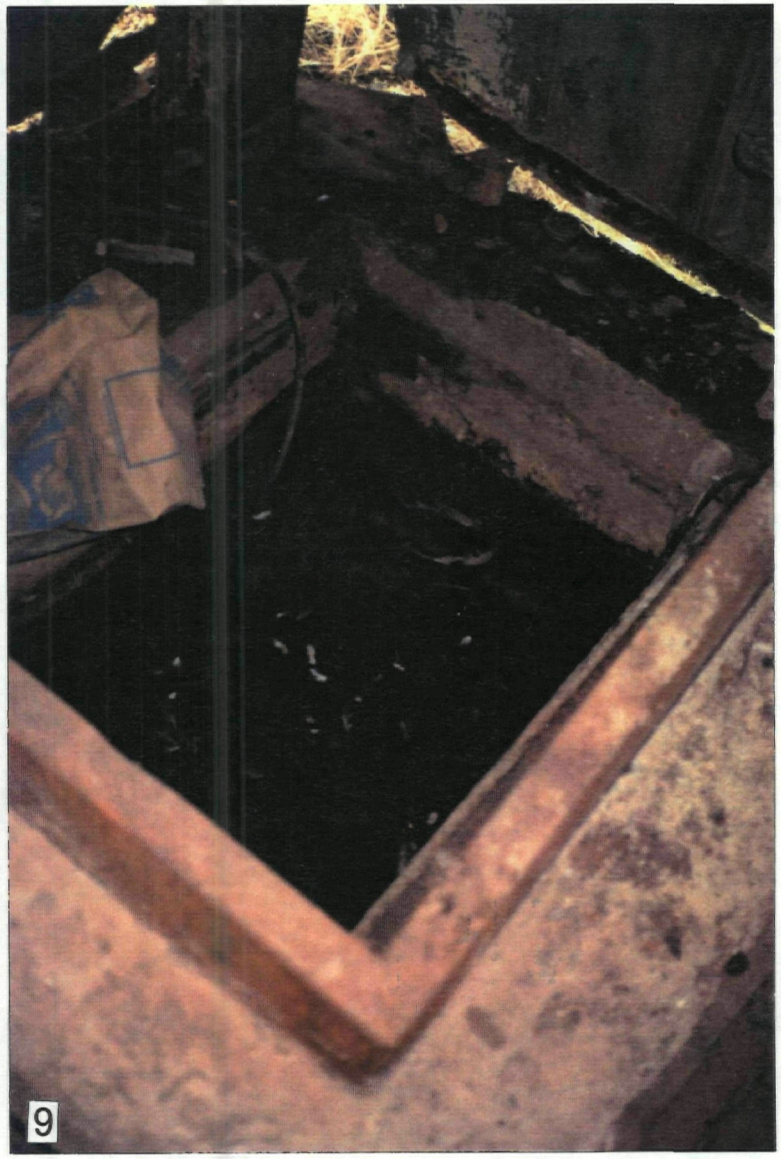

4


5


6


7


8


9


10


11


12

APPENDIX B - ROSE CHEMICALS
STRUCTURAL INSPECTION
MEMORANDUM

Burns & McDonnell
MEMORANDUM

Date: April 3, 1989

To: Files

From: Bruce Banister

Re: Rose Chemicals Structural Inspection
Project No. 88-025-4

A limited structural inspection was made of buildings on the Rose Chemicals site in Holden, Missouri, on March 29, 1989, by Bruce Banister of Burns & McDonnell. Two buildings were inspected: the Main Building and the South Warehouse Building. The inspection was limited in scope, as explained below:

1. Only visual inspection was performed. No sampling, probing, or testing of materials was done.

2. Visual inspection was limited to what could be viewed from standing on the ground floors of the buildings. The tops of the roofs were not inspected.

3. General absence of good lighting (especially in portions of the Main Building) limited the amount of detail that could be observed.

4. Viewing of the inside of the buildings' skin (metal panels) was often prevented by the presence of insulation.

5. No original construction drawings of the buildings were available to allow comparison of original design intent with present conditions.

Main Building

General: The Main Building is essentially a steel-framed structure with exposed metal roof and siding panels. The building is one story in height with a concrete floor slab at grade. Eave heights vary considerably depending on location. The building appears to be of the pre-engineered type, with tapered rigid steel frames being widely used as the main structural elements. The metal roof and siding panels are supported by purlins and girts, respectively, which span between the main frames. For the purpose of this memo, the building is divided into four areas, labeled Area A, Area B, Area C and Area D, as shown on the accompanying sketch.

Area A: This area lies on the south side of the Main Building and is essentially composed of rigid steel frames spanning in the north-south direction. The roof slopes two ways from an east-west ridge line running down the middle of Area A. The following observations were made:

1. The main rigid frame members, purlins and girts generally appeared to be in fairly good condition. Some corrosion was noted.

2. Several open holes and damaged areas in the metal siding were noted. One such location is at the west end of Area A (Refer to Photograph #1).

3. Three interior steel columns under the ridge line were noted to have damage in the form of bent flanges. Damage was generally located at the bottom portions of the columns (Refer to Photograph #2).

4. Several irregularities and damage were noted regarding the wind bracing for Area A, which may adversely affect lateral stability.

    a. At two bays on the north side of Area A, the vertical wind X-bracing between rigid frame columns appears to have been removed at some time, although some of the connection plates still remain in one location (Refer to Photograph #3).

    b. At one bay on the north side of Area A, both diagonal wind bracing rods have been disconnected from their respective anchorage points at the bottoms of the columns (Refer to Photograph #4).

    c. At one location at the east end of Area A, one of the diagonal wind bracing rods is broken (Refer to Photograph #5).

    d. At one location on the south wall and one location on the west wall of Area A, only one diagonal wind bracing rod is present where it might be anticipated that two rods should be present to form an "X".

    e. At one north-south column row (located approximately one fourth of the way from the west wall to the east wall) simple beam and post construction is present instead of the typical rigid frame. Apparently, this row may have been the original west wall before Area A was later expanded to the west. If this is true, diagonal wind bracing probably existing on this column row prior to

the expansion, but the bracing is no longer present. It is not known whether this bracing removal was taken into account.

5. The bottom of the ground floor slab has been exposed, possibly by erosion of the adjacent soil, at the west end of the south wall (Refer to Photograph #6).

Area B: This area lies in the northwest portion of the Main Building and is composed of rigid steel frames spanning in the east-west direction. The roof slopes two ways from a north-south ridge line running down the middle of Area B. The exterior walls of this area (west and north) have metal siding. Partial-height concrete block walls with metal panels above are located on the south and east sides of Area B and separate Area B from Area A and Area C, respectively. A large concrete pit is located in the north half of the area (Refer to Photograph #7).

The following observations were made in Area B:

1. The main steel framing members, purlins, and girts appeared to be in fairly good condition. Some corrosion was noted.

2. Damage was noted at the concrete block wall on the south side of Area B adjacent to the wall opening (Refer to Photograph #8).

3. Irregularities and damage in the wind bracing, which may adversely affect lateral stability, were noted as follows:

   a. At the south end of the east wall of Area B, one of the diagonal bracing cables is broken (Refer to Photograph #9).

   b. At two other locations on the east wall, wind bracing which would normally be expected to be present (based on positions of bracing in the roof) was missing.

4. Some damage to the metal siding was noted.

Area C: This area lies on the north side of the Main Building, between Areas B and D. The main framing in this area generally consists of steel roof beams running in the east-west direction which are supported by steel columns. Some framing appears to be of the rigid frame type; other portions appear to be of the simple beam and post type. Monorail beams are hung from the roof framing in several locations. The roof slopes two ways from a north-south ridge line. On the west side of this area are the common metal wall panels between Areas B and C. The north side (exterior wall) of Areas C has metal siding. On the south side (common wall between Areas A and C) is a concrete block wall which has evidently been partially demolished.

The following observations were noted:

1. The majority of the structural steel framing members appear to be in fairly good condition. Some corrosion was noted.

2. At a minimum of two locations, the existing interior steel columns have been damaged. The lower portions of these columns have been bent, quite severely in at least one instance (Refer to Photograph #10).

3. In the area where the concrete block wall has been removed along the boundary with Area A, several situations were noted which may adversely affect the ability of the existing roof to support load:

   a. A steel column which appears to have been intended to support the roof is severely bent and twisted and nonfunctioning (Refer to Photograph #11).

   b. A portion of the east-west roof beam which runs across a part of this area is twisted.

   c. At one location, the existing north-south roof purlins are supported by only a steel angle member which appears to be of questionable strength for spanning the required distance. A steel column which appears to provide some support for the steel angle is out of plumb and is not anchored at its base (Refer to Photograph #12).

4. One steel column, which apparently was intended to help support one of the existing monorails, is out of plumb and unanchored and free to move laterally (Refer to Photograph #13).

5. At the south end of the east side of Area B (adjacent to Area D), damage was noted in several of the steel roof members. Also, the steel angle brackets in this area (welded to Area D columns) appear to be of questionable adequacy (Refer to Photograph #14).

6. In at least two places, wood posts have apparently been added as a temporary measure to support the roof.

7. Some damage to the metal siding was noted.

Area D: This area lies in the northeast portion of the Main Building. The majority of the roof in this area is supported by rigid steel frames spanning in the east-west direction. The roof slopes two ways from a north-south ridge line. An overhead bridge crane runway system is bracketed from the columns (Refer to Photograph #15). The north, south,

and east sides of this area are covered with metal siding, immediately inside which lies a partial-height concrete block wall. The west side has metal siding from roof level down to the roof of adjacent Area C.

The following observations were made:

1. The main framing, purlins, girts, and block walls appear to be in fairly good condition. Some steel corrosion was noted.

2. The vertical X-bracing on the west side of Area D extends from roof level down to approximately the crane girder level. There is some question as to whether the bracing should continue down to ground level.

South Warehouse Building

The South Warehouse is of the same general type of construction as the Main Building. The majority of the building is composed of rigid steel frames spanning in the east-west direction, with the roof sloping two ways from a north-south ridge line (Refer to Photograph #16). Within a portion of this area, wood truss rafters have been used instead of the typical steel purlins (Refer to Photograph #17). An additional portion of the building projects to the east and is composed of simple steel beam and column framing.

The following observations were made:

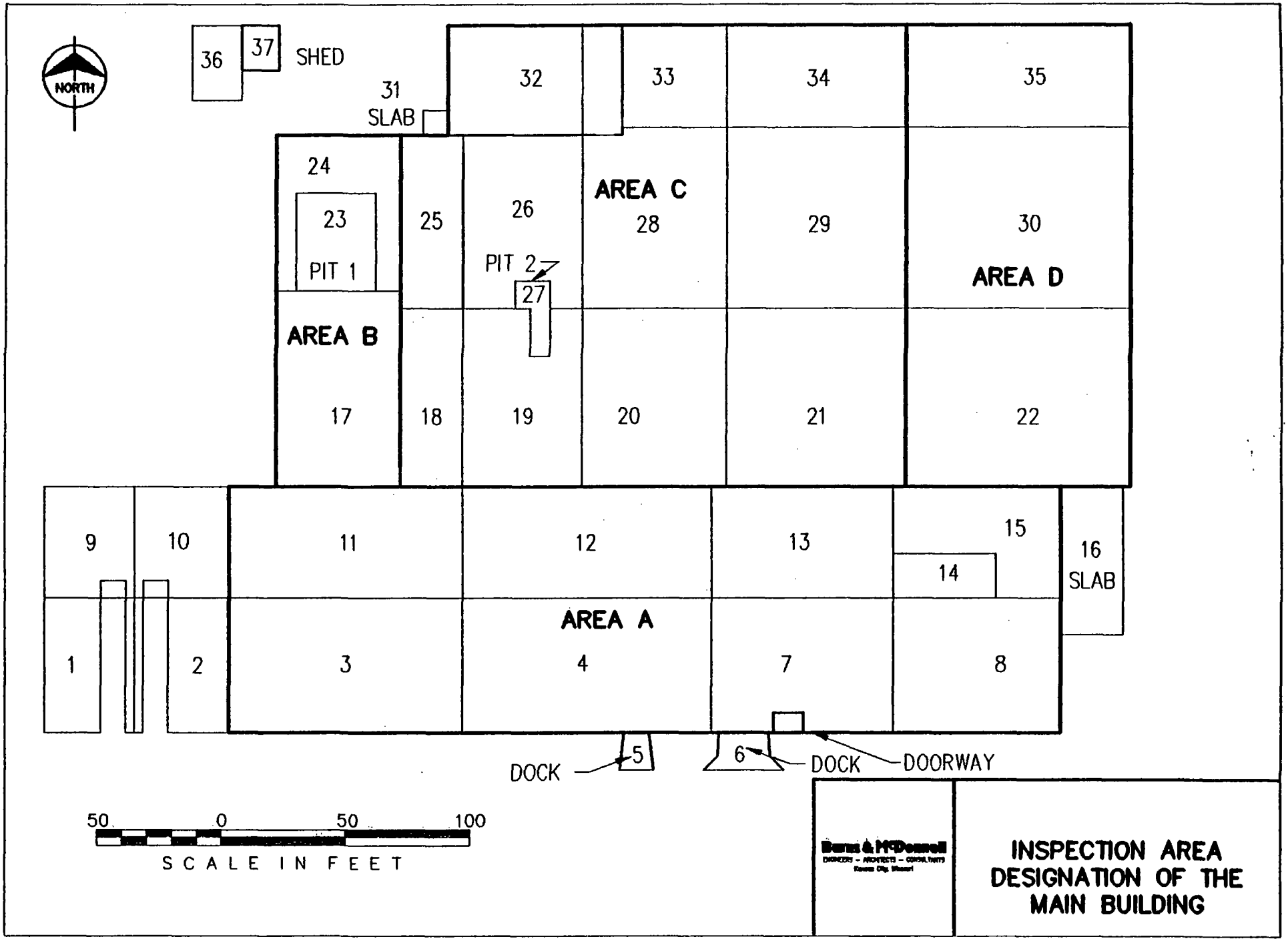
1. The main framing members, purlins and girts appeared to be in fairly good condition, although corrosion and accumulation of debris on steel surfaces was commonly noted.

2. One large hole and several other damaged areas exist in the metal siding (Refer to Photographs #18 and #19).

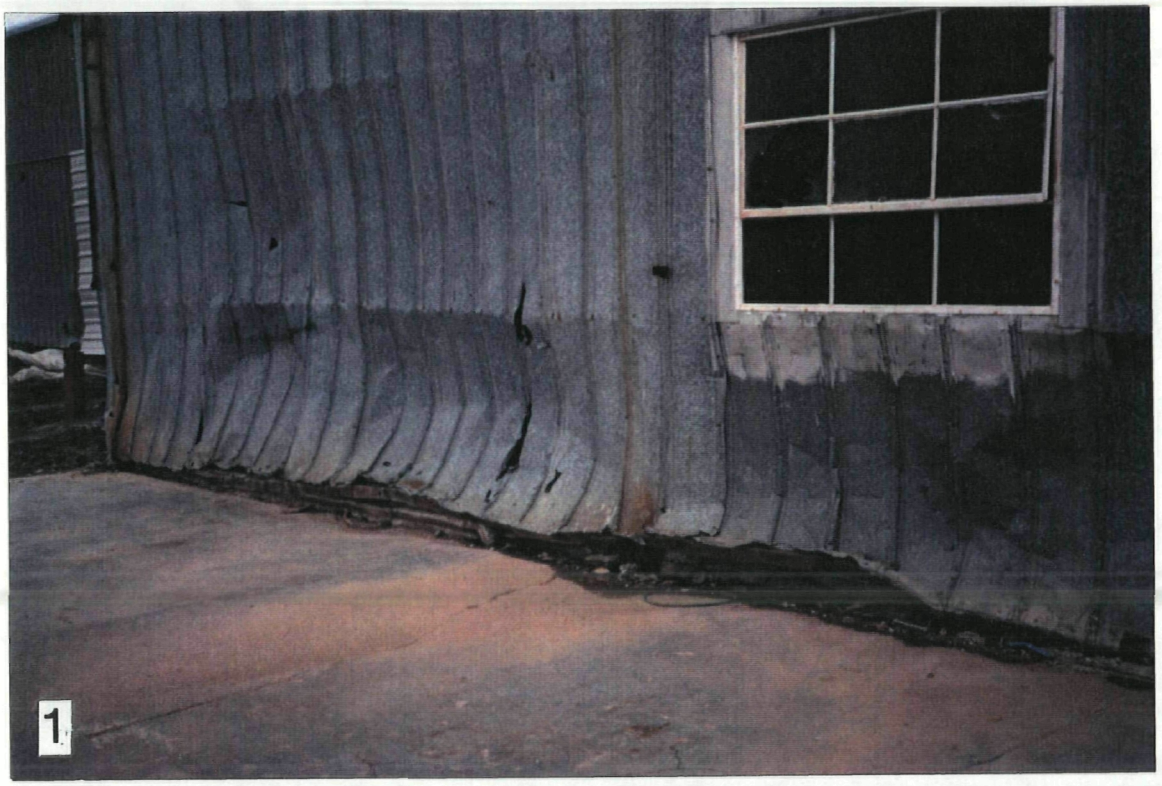
3. Corrosion was noted on the top and bottom surfaces of the metal roof panels (Refer to Photograph #20).

4. At one location on the east side of the main structure, one of the steel rods composing the wind X-bracing is broken (Refer to Photograph #21). At several other locations where one might normally expect to find vertical X-bracing (based on the positions of existing bracing in the roof), the bracing was not present. The combination of these items raises questions about the lateral stability of the structure.

BB/mvc378



FIGII-1 6-19-89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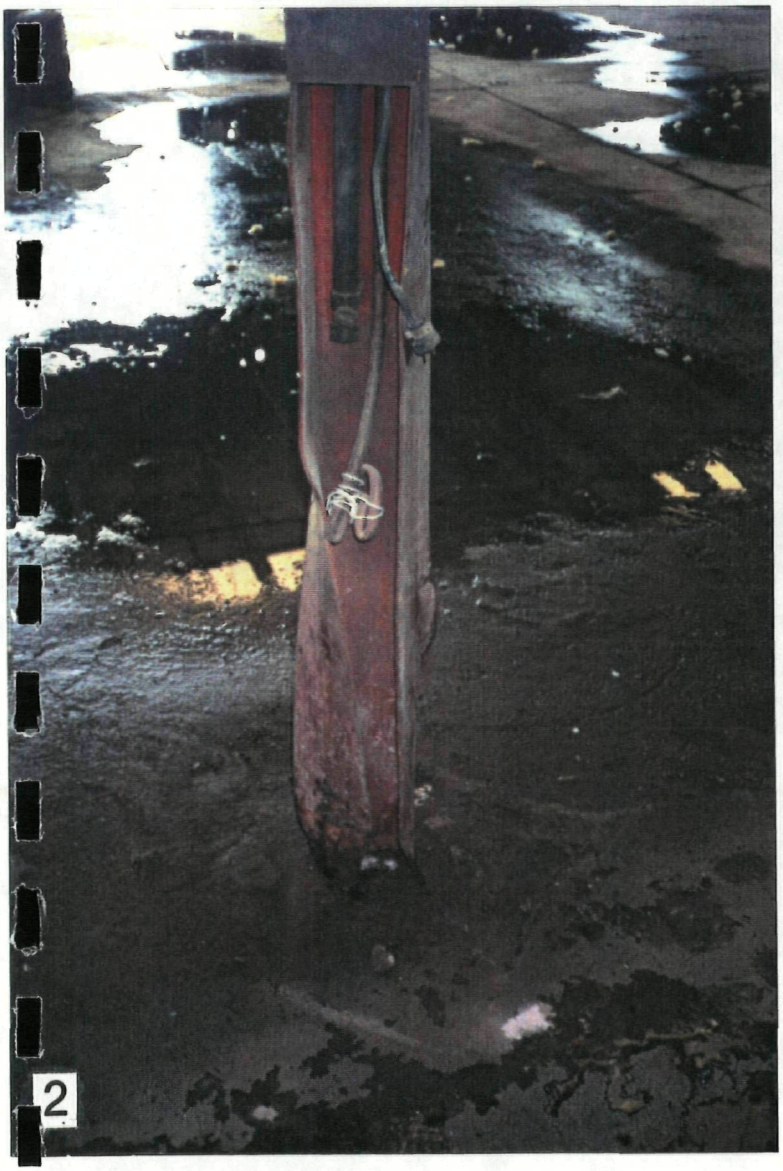
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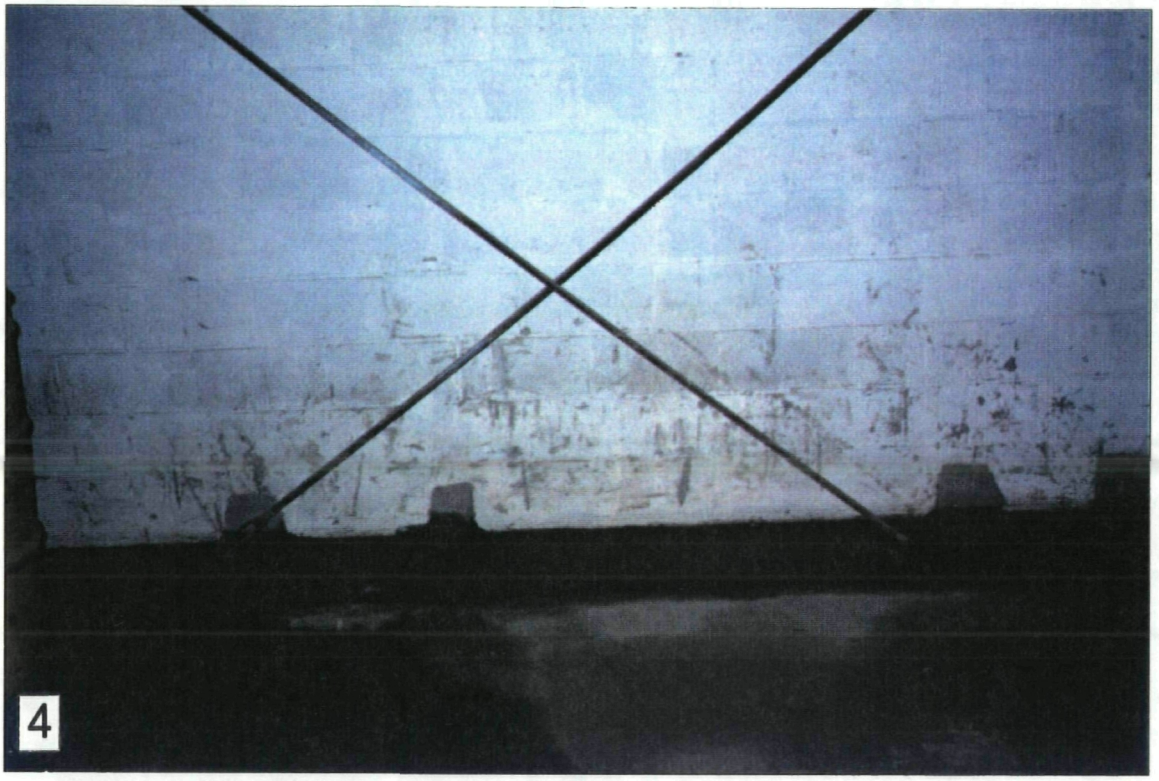
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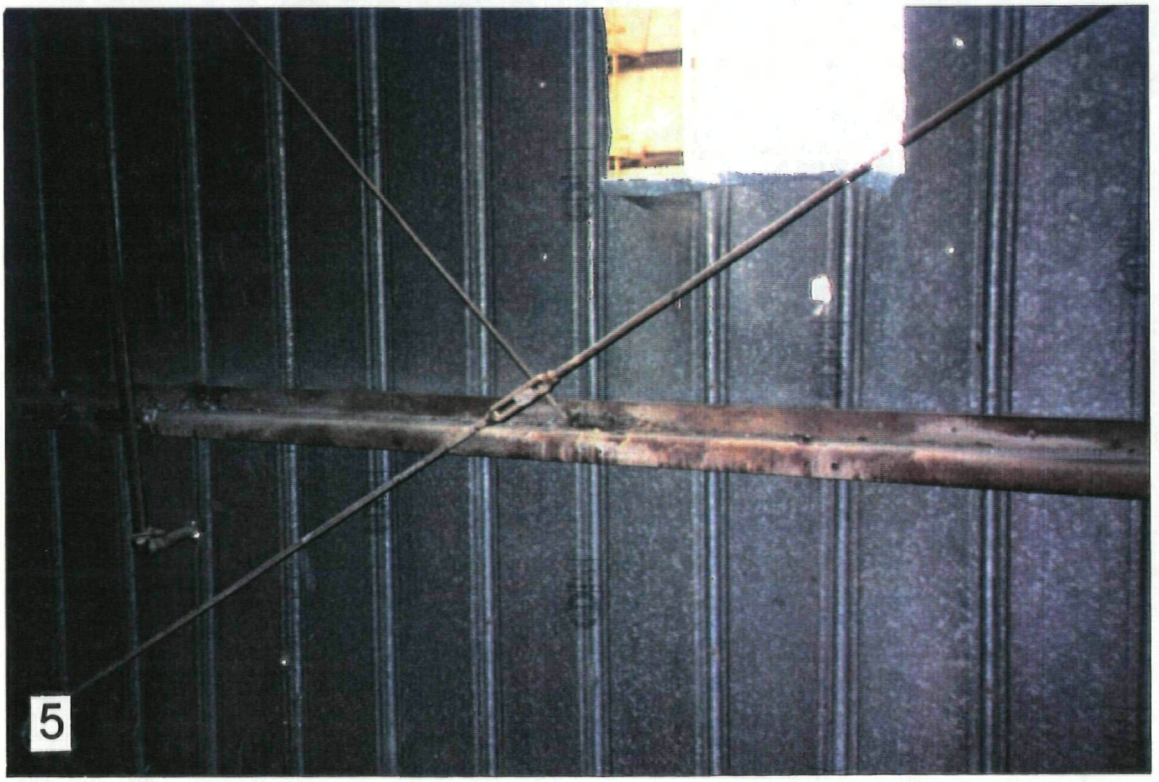
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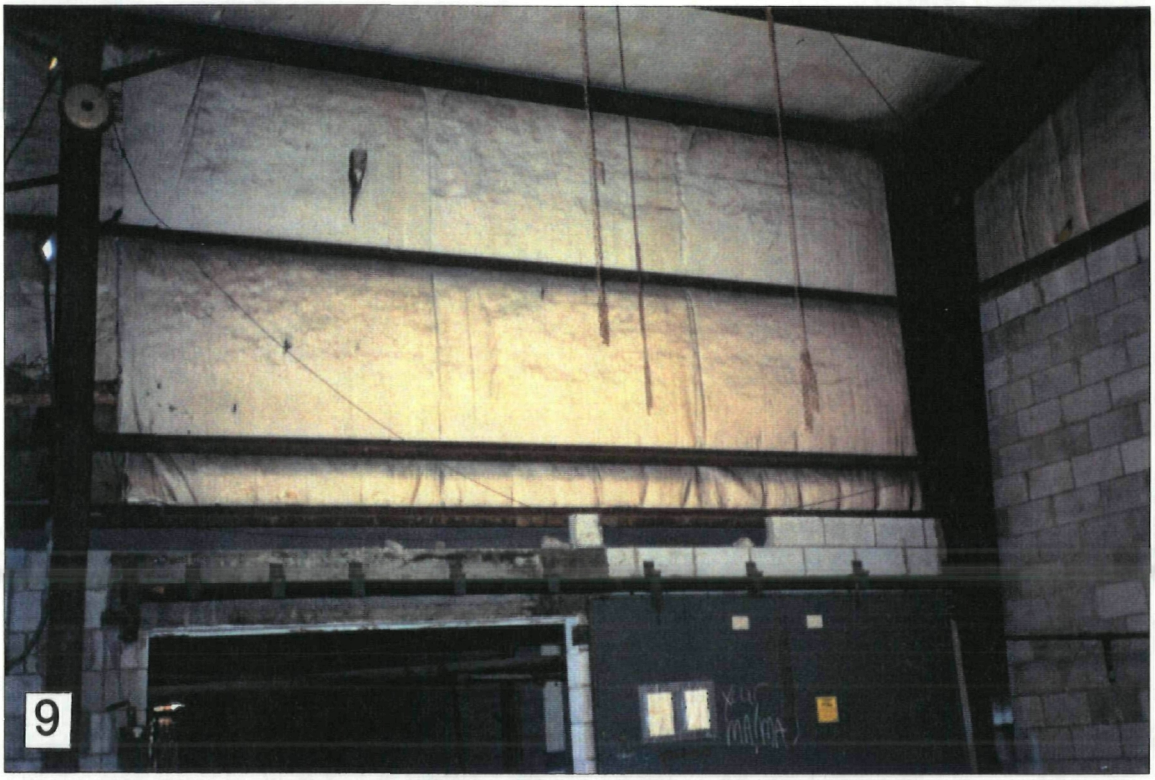
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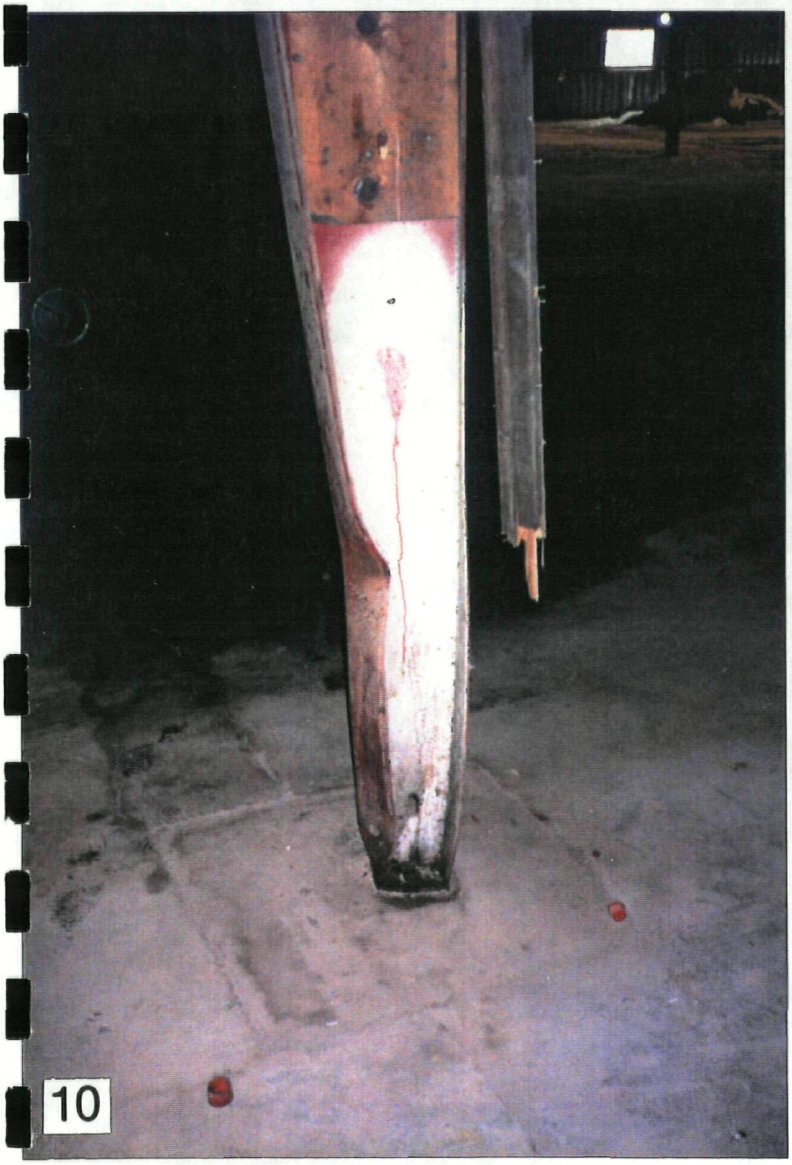
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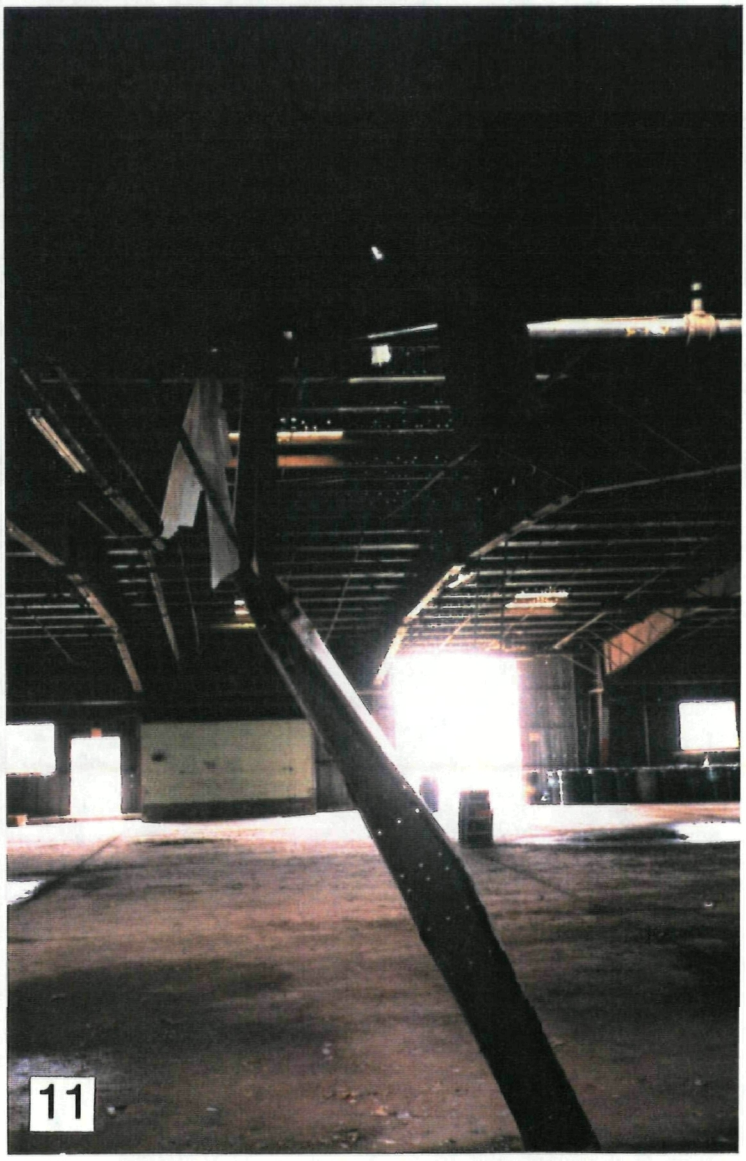
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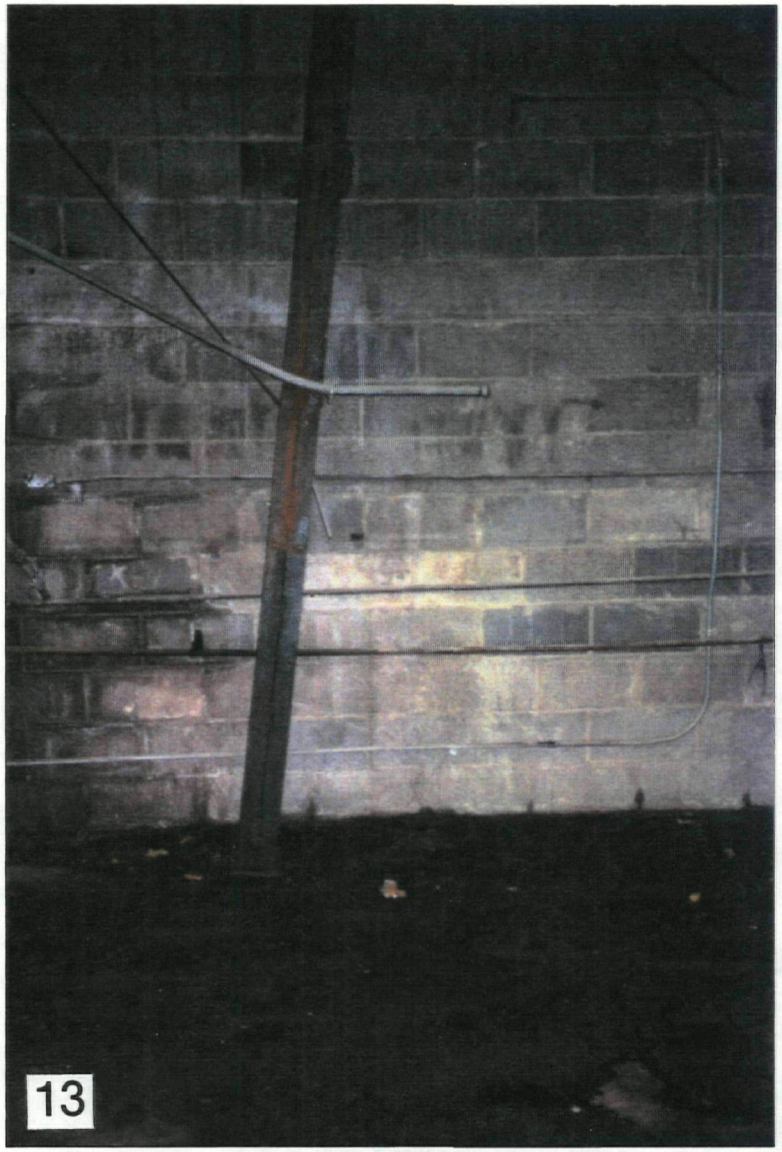
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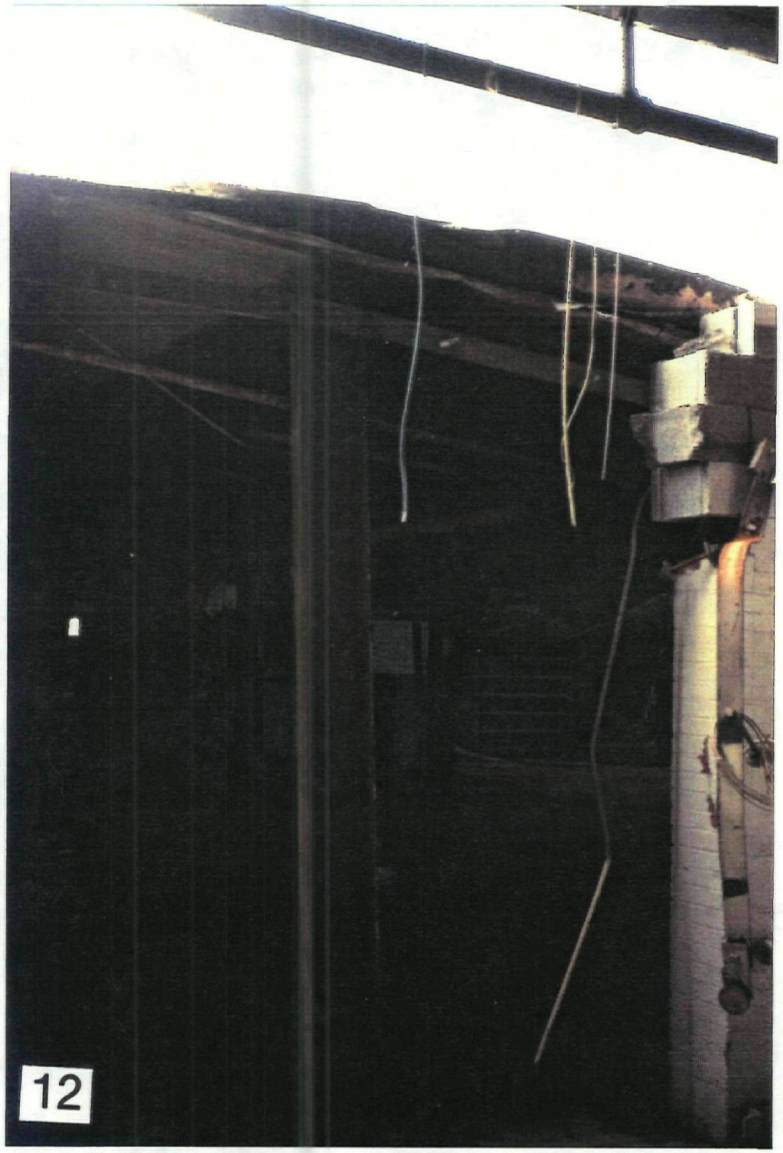
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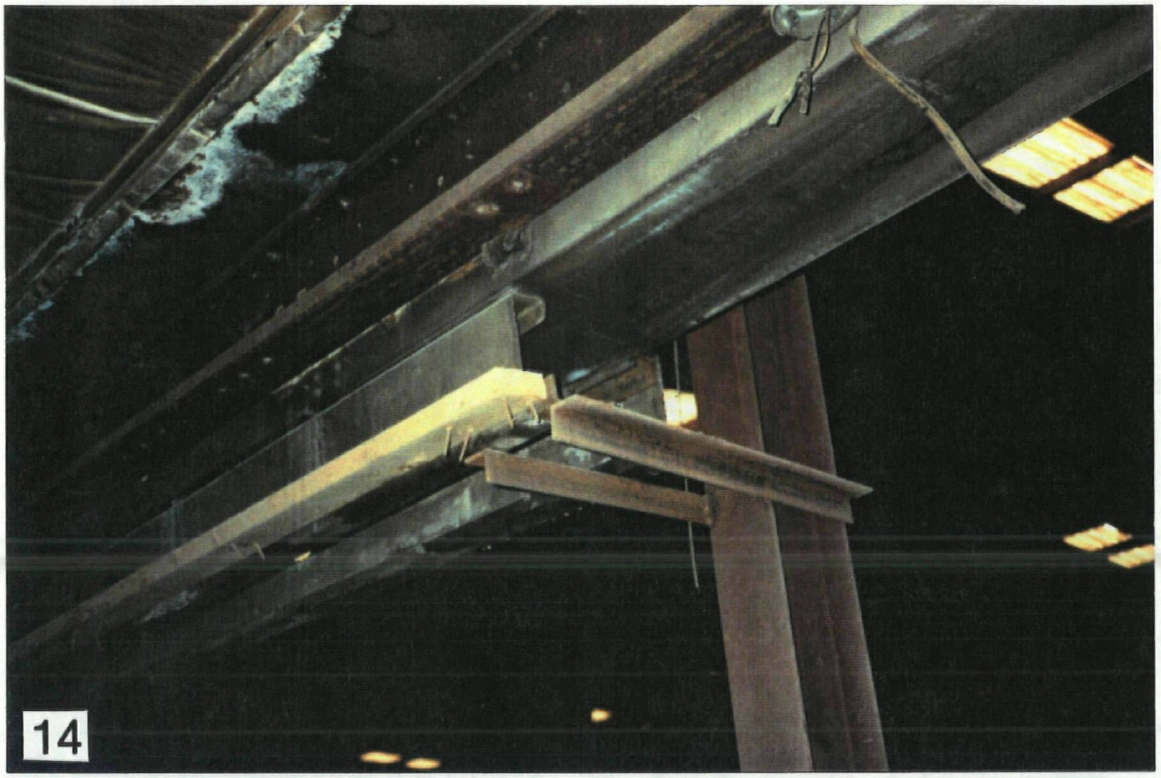
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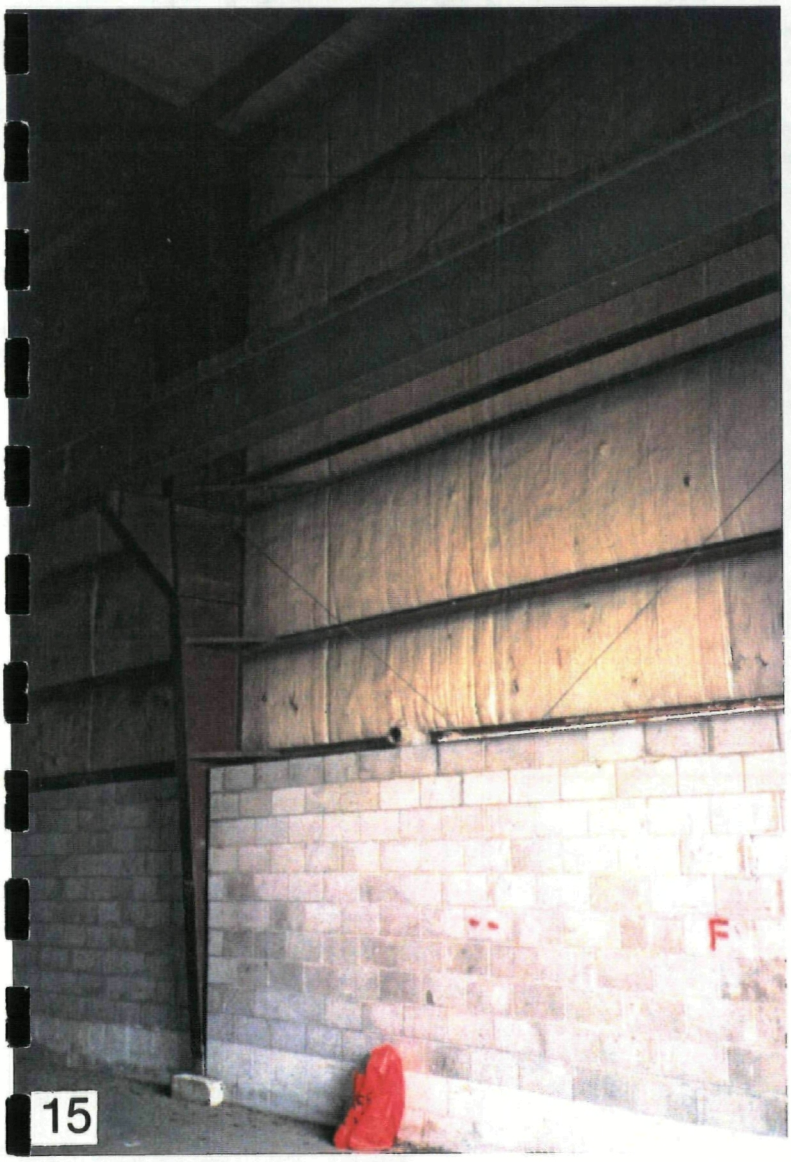
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APPENDIX C - INTERIOR BORING LOGS

Doc. No. DL-No. 1

Drilling Log

Project Name: ROSECHEM						Boring No.: B-1	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation		Location: GRID 7				Total Footage: 12' 0"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	6"	12' 0"	0	6	N/A	SEE REMARKS	

Drilling Co.: LAYNE WESTERN — Driller (s): TOM BUTLER, RUSTY BOWLES

Drilling Rig: SKID MOUNTED RIG — Type of Penetration Test: STANDARD

Date: 1/6/89 — To: 1/6/89 — Field Observer (s): MARTHA HILDEBRANDT, D. BALLARD

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
0	Concrete and gravel pad					START 1:57p.
1	Black sticky clay, firm, no plasticity		5/11/9/6	18"/24"	SS1	1:59p Tip=0 ppm
3	Dark Brown, Clay, firm, iron staining, low plasticity, damp		11/13/13/14	18"/24"	SS2	2:15p Tip=0ppm
5	Same as above, Black spot 5½' to 6'.		8/7/9/10	22"/24"	SS3	2:19p Tip=0ppm
7	Reddish brown, iron stained Clay with grey mottling, Stiff, organic staining		9/10/10/15	22"/24"	SS4	2:40p Tip=0ppm
9	Orange Brown and Grey mottled Clay w/ gravel in places		14/21/31	18"/18"	SS5	Tip=2ppm at 9" 3:06p Tip=0ppm Rockfragments
10	Very thin shale/sand at 10.5' Weathered shale at 9.5'					
11	Weathered shale interbedded w/ iron clay		19/24/50	17½"/18"	SS6	3:26p Tip=0ppm
12	Total Depth 12' 0"					Finish 3:40p Hole dry at completion
13						

Doc. No. DL-No. 2

Drilling Log

Project Name	Boring No.
Rose Chem	B-2
Project No.	**Page** 1 of 1
88-025-4	
Ground Elevation	**Location** Grid 12
Total Footage 11' 6"	

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
Hollow Stem Auger	6"	11' 6"	0	6	N/A	See Remarks	

Drilling Co. Layne Western	Driller (s) Tom Butler, Rusty Bowles
Drilling Rig. Skid Mounted Rig	Type of Penetration Test Standard
Date 11/6/89 To 11/6/89	Field Observer (s) M. Hildebrandt, D. Ballard

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
1	Concrete pad & gravel					START 8:40
2	Dk. Brn. to Blk. Clay, Med. Plasticity		5/4/5/8	5/22/24"	SS1	Tip=0 8:50a Tip=0
3	Light Clay (6") at 3'					
4	Organic Debris (3' to 5')		13/11/12/10	18"/24"	SS2	8:56a Tip=0ppm
5						
6			6/7/8/8	15"/24"	SS3	9:10a Tip=5ppm
7	Red Clay, Moist, Med Plasticity					
8	Orange and Gray mottled throughout, gravel, iron staining		9/8/6/13	18"/24"	SS4	9:19 Tip=5ppm
9						2 ppm at 9"
10			11/19/23/29	24"/24"	SS5	9:43a Tip=2ppm
11	Weathered Shale, Iron, Damp to Dry Red-Orange				SS6	
12	TOTAL DEPTH 11' 6"		50 to Refusal	6"/6"		10:03a Tip=6ppm
13						Finish 10:20a Dry at completion

Doc. No. DL - No. 3

Drilling Log

Project Name: Rose Chem.						Boring No.: B-3	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation		Location: Grid 23				Total Footage: 2' 8"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
5" Conc. Core 3" Hand Auger	3" core 3" AUGER	2' 8"	0	3	N/A	See Remarks	

Drilling Co.: Layne Western		Driller (s): Tom Butler, Rusty Bowles	
Drilling Rig: Skid Mounted Rig		Type of Penetration Test: Standard	
Date: 1/7/89	To: 1/7/89	Field Observer (s): M. Hildebrandt, D. Ballard	

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
	Concrete pad and gravel in pit bottom.						START 11:45a
1	Gray clay, grading into orange-gray mottled, moist, medium plasticity, medium, trace of gravel, iron staining. Weathered shale at 2'6".				1	S-1	12:20p Replicate
2					2	S-2	12:33p Replicate
3	TOTAL DEPTH 2'8"				3		Finished hole at 12:45p
4					4		Water in pit bottom at completion from seepage.
5					5		
6					6		
7					7		
8					8		
9					9		
10					10		
11					11		
12					12		
13					13		

Doc. No. DL-No. 4

Drilling Log

Project Name: Rose Chem						Boring No.: B-4	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation		Location: Grid Z1				Total Footage: 10' 2.5"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
Hollow Stem Auger	6"	10' 2½"	0	6	N/A	See Remarks	

Drilling Co.: Layne Western — Driller (s): Tom Butler, Rusty Bowles

Drilling Rig: Skid Mounted Rig — Type of Penetration Test: Standard

Date: 1/9/89 To: 1/9/89 — Field Observer (s): M. Hildebrandt, D. Ballard

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
1	Concrete Pad and gravel					START 9:36am
2	Dk. Brn. clay, Moist, Organic Debris, Med Plasticity		5/5/6/9	15"/24"	SS1	9:41 Tip = 0 ppm
3						
4	Grey & Orange Clay, Moist, Med Plasticity, traces of gravel, organic debris, iron staining		11/13/19/15	22"/24"	SS2	9:45 Tip = 0 ppm
5						
6			5/4/7/17	22"/24"	SS3	10:04 Tip = 0 ppm Took replicate B-4A/SS-3
7						
8			13/11/12	18"/18"	SS4	10:12a Tip = 0 ppm Heavy iron staining
9			9/15/31/50	20½"/20½"	SS5	10:30 Tip = 0 ppm trace water @ 9.5'
10	Weathered Shale, Rd-Org.		only advanced 2½"			
11	TOTAL DEPTH 10' 2½"					
12						Hole dry upon completion
13						Finish 10:49

Doc. No. DL- No. 5

Drilling Log

Project Name: Rose Chem						Boring No.: B-5	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation	Location: Grid 19					Total Footage: 11' 3"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
Hollow Stem Auger	6"	11'3"	0	6	N/A	See Remarks	

Drilling Co.: Layne Western — Driller (s): Tom Butler, Rusty Bowles

Drilling Rig: Skid Mounted Rig — Type of Penetration Test: Standard

Date: 1/9/89 To 1/9/89 — Field Observer (s): M. Hildebrandt, D. Ballard

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
1	Concrete pad and gravel					START 1:47p
2	Blk Clay, Highly Plastic, Moist, Organic Debris		5/4/4/6	18"/24"	SS1	1.3 ppm 1:50 p Tip = 0ppm
3						1.1 ppm
4			8/8/9/9	20"/24"	SS-2	1:55 p gravel seam at Tip=0 3½'
5						1.5ppm
6			9/5/7/9	20/24"	SS3	2:13p Tip=0ppm
7	Orange & Grey mottled clay, moist, Mod Plasticity, heavy iron & iron staining					1.9ppm
8			5/9/10	14"/18"	SS4	2:21p 0ppm
9						1.9ppm
10	Weathered Shale and Clay, Org Moist. The Clay is mottled org. &gry.		5/10/12	14"/18"	SS5	2:33 Tip=0ppm
11			27/30/50	15"/15"	SS6	1.6ppm 2:47 Tip=0ppm
12	TOTAL DEPTH 11' 3"					hole dry upon completion
13						Finish 3:00p

Doc. No. DL- No. 6

Drilling Log

Project Name: Rose Chem						Boring No.: B-6	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation		Location: Grid 28				Total Footage: 10' 6"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
Hollow Stem Auger	6"	10' 6"	0	5	N/A	See Remarks	

Drilling Co.: Layne Western		Driller (s): Tom Butler, Rusty Bowles	
Drilling Rig: Skid Mounted Rig		Type of Penetration Test: Standard	
Date: 1/10/89	To: 1/10/89	Field Observer (s): M. Hildebrandt, D. Ballard	

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
1	Concrete Pad, & gravel					START 8:40a
2	Dk. Brn. Clay, Moist, Med Plasticity		5/5/4/7	6"/24"	SS1	8:46a Tip = 0 ppm
3						
4	Orange & Gry Mottled Clay, Moist, Med. Plasticity, iron staining - hvy. in places, Soft.		8/9/14/12	22"/24"	SS2	8:50a Tip = 0 ppm Replicate B-6 AISS-2 taken
5						
6			5/5/7/8	22"/24	SS3	9:08a Tip = 0 ppm
7						
8			9/8/9/11	24"/24"	SS4	9:15a Tip = 27 ppm
9						
10	Weathered shale. interbedded w/clay, red, moist.		9/12/21/50 (achieved 1")	/19"	SS5	9:32a Tip = 10 ppm
11	Total Depth = 10' 6"					
12						Hole dry upon completion
13						Finish 9:45

Doc No. DL-No. 7

Drilling Log

Project Name						Boring No.	
ROSECHEM						B-7	
Project No.						Page	of
88-025-4						1	1
Ground Elevation		Location				Total Footage	
		GRID 34				11' 6"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	6"	11'6"	0'	6	N/A	SEE REMARKS	
Drilling Co.	LAYNE WESTERN				Driller (s)	TOM BUTLER, RUSTY BOWLES	
Drilling Rig.	SKID MOUNTED RIG				Type of Penetration Test	STANDARD	
Date	1/10/89	To	1/10/89		Field Observer (s)	M. HILDEBRANDT, D. BALLARD	

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
	Concrete pad & gravel						START 10:55a
1					1		
	gry clay and gravel, moist, soft highly plastic		17/10/8/8	16"/24"		SS1	11:02a
2					2		Tip =
3					3		
	orange tan and grey mottled clay, moist, firm, med. plasticity, iron staining & concretions.		6/6/14/12	20"/24"		SS2	11:12a
4					4		Tip- 11 ppm
							Replicate sample taken
5					5		borehole Tip: 9 ppm
			10/10/10/10	22'/24'		SS3	2:06
6					6		Tip = 195 ppm
7					7		
			10/10/10/12	22'/24		SS4	2:14
8					8		Tip = 19 ppm
	Orange weathered shale interbedded w/ org. cly.						
9			12/50/38/40	24"/24"	9		5ppm at hole
	Org. & gry mottled cly. w/ iron staining					SS5	2:42p
10					10		Tip = 72 ppm
	Org. weathered sh interbedded w/ org cly.		50/5inches	5"/5"			
11					11	SS6	2:54p
	Total depth 11.5'						Tip = 20ppm
12					12		
							Hole dry upon completion
13					13		FINISH 3:05

Doc. No. DL- No. 8

Drilling Log

Project Name						Boring No.	
ROSECHEM						B-8	
Project No.						Page 1 of 1	
88-025-4							
Ground Elevation		Location				Total Footage	
		GRID 32				12'0"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	6"	12'0"	0'	7	N/A	SEE REMARKS	
Drilling Co.	LAYNE WESTERN				Driller (s)	TOM BUTLER, RUSTY BOWLES	
Drilling Rig.	SKID MOUNTED RIG				Type of Penetration Test	STANDARD	
Date	1/1/89	To	1/1/89		Field Observer (s)	M. HILDEBRANDT, D. BALLARD	

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
1	Concrete and gravel				1		START 8:30a
2	Dk. brn. to blk. clay, moist, med. plasticity		7/9/9/11	12"/24"	2	SS1	8:44a Tip = 1ppm
3					3		borehole Tip - 0ppm
4	Dull grey-green clay with orange mottling. Oil staining, Med. plasticity, iron staining. gravel in places		10/15/13/19	18"/24"	4	SS2	8:51a Tip = 9ppm
5					5		borehole Tip = 7ppm
6			10/7/6/8	22"/24"	6	SS3	9:14a Tip = 25ppm Replicate taken VOA
7					7		borehole Tip: 4ppm
8			7/8/8/10	24"/24"	8	SS4	Replicate PCB 9:20a Tip = 10ppm
9					9		
10			5/8/11/10	24"/24"	10	SS5	9:37a Tip = 20ppm
11	Weathered Sh. interbedded w/clay. Orange with iron staining, Moist.		18/50	11"/11"	11	SS6	9:44a Tip = 15ppm
12	Total Depth = 12"		advanced 5"		12		Hole dry upon completion
13					13		FINISH 9:51a

Drilling Log

Project Name	Boring No.
ROSECHEM	B-9
Project No.	**Page** of
88-025-4	1 / 1

Ground Elevation	Location	Total Footage
	GRID 39	4'6"

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
Manuel Bucket Auger	3"	4'6"	0'	8	N/A	See Remarks	

Drilling Co.	Driller (s)
Drilling Rig.	Type of Penetration Test
Date 1/ /89 To 1/ /89	Field Observer (s) Hildebrandt, Ballard

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
	Concrete Pad & Gravel					Start 11:28a
1	CLAY, grey-green, high plasticity, wet				HA-1	Tip = 0ppm Headsp Readi 11:40a 5.2
2					HA-2	11:50a 4.7
					HA-3	11:53a 6.3
3					HA-4	12:10a 3.8
					HA-5	12:23p 4.1
4					HA-6	12:30p 4.1
5	Total Depth 4.5 feet					

Doc.No. DL - No. 10

Drilling Log

Project Name: ROSE CHEM						Boring No.: B-10	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation		Location: GRID 25				Total Footage: 9' 0"	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HAND AUGER	3"	9' 0"	0'	8	N/A	SEE REMARKS	

Drilling Co.: LAYNE WESTERN — Driller (s): TOM BUTLER, RUSTY BOWLES

Drilling Rig: SKID MOUNTED RIG — Type of Penetration Test: STANDARD

Date: 1/ /89 — To: 1/ /89 — Field Observer (s): M. HILDEBRAND, D. BALLARD

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
0	Concrete pad and gravel					START
1	Brown and gray mottled clay, moist, highly plastic, organic debris.				HA-1	2:30p TIP = 254ppm
2					HA-2	2:35p TIP = 94ppm
3					HA-3	2:40p TIP = 55p EPA H-3 2:45p 38ppm
4					HA-4	2:50p TIP = 33ppm
5					HA-5	3:00p TIP = 36 ppm
6	Brown and orange mottled clay, stiff, damp, medium plasticity, iron staining, weathered shale at total depth.				HA-6	3:10p TIP = 13ppm
7					HA-7	3:20p TIP = 15ppm
8					HA-8	3:30p TIP = 6ppm
9	Total Depth 9'0"					Finish 3:35p. Dry at completion
10						
11						
12						
13						

Doc. No. DL- No. 11

Drilling Log

Project Name: Rose Chem						Boring No.: B-11	
Project No.: 88-025-4						Page: 1 of 2	
Ground Elevation		Location: Grid 1				Total Footage	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
Hollow Stem Auger	6"		0	[illegible]	N/A	See Remarks	

Drilling Co.: Layne Western — Driller (s): Tom Butler, Rusty Bowles

Drilling Rig: CME 55 — Type of Penetration Test: Standard

Date: 1/19/89 — To: 1/19/89 — Field Observer (s): N. HILDEBRANDT, D. BALLARD

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
0	Concrete pad and gravel						START 9:01
1			6/6/6/7	6"/24	1	SS-1	Recovered only gravel. 9:05a 1-VOA
2					2		
3	Dark brown clay, moist, medium to highly plastic, iron staining, medium		6/3/1/2	8"/24	3	SS-2	9:10a TIP: 3 ppm Recovered only gravel and small amount of clay. 1-VOA / 1 PLP
4					4		
5	Brown and orange mottled clay, moist, medium, medium plasticity, some till material		3/4/7/8	19"/24	5	SS-3	9:18 TIP: 4 ppm
6					6		
7			3/3/3/5	12"/24	7	SS-4	9:27a. TIP: 9 ppm red pt. in spoon sample.
8					8		
9			4/5/8/11	12"/24	9	SS-5	9:35a TIP: 3.4 ppm
10					10		
11			5/5/9/13	/24	11	SS-6	9:45a TIP: 4.3 ppm
12					12		
13			5/9/15/50	/24	13	SS-7	9:52a TIP: 4.4 ppm 50 blows/5"

Doc. No. DL-No. 11

Drilling Log, continued

	Boring No. B-11
Project Name ROSECHEM	Page 2 of 2
Project No. 88-025-4	Date 1/19/89

Depth	Description	Log or Class	Blow Count	Core Recov. & Loss		Box or Sample No.	Remarks
15	Weathered shale				15	SS-7	T.P. B-11A-SS-7 = 3ppm
16					16		
17					17		
18					18		
19					19		
20					20		
21					21		
22					22		
23					23		
24					24		
25					25		
26					26		
27					27		
28					28		
29					29		
30					30		

Doc. No. DL-No. 12

Drilling Log

Project Name	Boring No.
ROSECHEM	B-12
Project No.	**Page** / **of**
88-025-4	1 / 1
Ground Elevation	**Location**	**Total Footage**
	GRID D	13' 0"

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER			0'		N/A	SEE REMARKS	

Drilling Co. LAYNE WESTERN	**Driller (s)** TOM BUTLER, RUSTY BOWLES
Drilling Rig. SKID MOUNTED RIG	**Type of Penetration Test** STANDARD
Date 1/20/89 **To** 1/20/89	**Field Observer (s)** M. HILDEBRANDT, D. BALLARD

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
1	Concrete pad and gravel					START 8:41a.
2	Brown and gray mottled clay, moist, highly plastic, trace organic debris		5/6/6/9	15"/24"	SS-1	8:45a TIP 2 ppm
3						
4			11/8/10/11	14"/24"	SS-2	8:55a TIP 2 ppm
5						
6	Orange and brown mottled clay, moist, medium plasticity, iron stains		2/2/6/9	13"/24"	SS-3	Sample was wet in spoon. 9:03a TIP 9 ppm
7						
8			4/6/7/8	19"/24"	SS-4	9:08a TIP 4 ppm EPA - 9:10a. PCB: 1 VOC
9						
10			3/7/10/17	/24	SS-5	9:15a TIP: 4 ppm
11						
12	Orange and brown mottled clay, damp, iron staining, weathered shale		17/23/38/42		SS-6	9:25a TIP: 2 ppm
13	Total Depth 13'0"					

Drilling Log

Project Name	Boring No.
ROSECHEM	B-13
Project No.	**Page** 1 of 1
83-025-4	

Ground Elevation	Location	Total Footage
835.7	NW ¼ . Grid 2	10.5'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	10.5'	0	5	0	N/A	N/A

Drilling Co. LAYNE WESTERN	Driller (s) O. J. HARPER / DAVID BOWLES
Drilling Rig. AD-2	Type of Penetration Test STANDARD
Date 5-23-89 To 5-23-89	Field Observer (s) HILDEBRANDT, ROBINSON

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD					START
1	BROWN CLAY W/ ORANGE STAINING, MED PLASTIC, GRAY MOTTLING		3/5/7/8	16"/24"	SS-1	10:00 A TIP = 0.3 PPM SAMP TIP = 0.1 PPM B.Z TIP = 0.2 PPM BIRIM
2						
3	AS ABOVE		6/9/7/12	13.25"/24"	SS-2	10:15 A TIP = 1.1 PPM SAMP TIP = 0.1 PPM B.Z.
4						
5	BROWN CLAY W/ ORANGE STAINING, MED PLASTIC, DARK GRAY MOTTLING		9/10/10/9	11.5"/24"	SS-3	10:20 A TIP = 1.2 PPM SAMP TIP = 0 PPM B.Z. TIP = 0.2 PPM BARE
6						
7	DARK BROWN CLAY, MOIST, LOW PLASTIC, VERY SOFT W/ ROOTS		7/7/8/10	12.25"/24"	SS-4	10:31 A TIP = 1.6 PPM SAMP TIP = 0 PPM B.Z. TIP = 0 PPM BUREM
8						
9	DARK BROWN CLAY, MOIST, MED PLASTIC, ROOTS THRU-OUT, FEW IRON CONCRETIONS		11/10/10/12	13"/24"	SS-5	10:38 A TIP = 0.2 PPM SAM TIP = 0 PPM B.Z. TIP = 0 PPM BORE
10						
11	TOTAL DEPTH 10.5'					FINISH
12						
13						

Drilling Log

Project Name	Boring No.
ROSEMEM	B-14
Project No.	**Page** of
83-025-4	1 of 1
Ground Elevation	**Location**	**Total Footage**
835.8	S 1/2, Grid 10	10.5'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	10.5'	0	5	0	N/A	N/A

Drilling Co. LAYNE WESTERN	**Driller (s)** O.J. HARPER / DAVID BOWLES
Drilling Rig. AD-2	**Type of Penetration Test** STANDARD
Date 5-23-89 **To** 5-23-89	**Field Observer (s)** HILDEBRANDT, ROBINSON

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD					START
1	2" RED CLAY W/ WHITE MOTTLING BLUEISH CLAY LAYER @ 1.2' GRAY CLAY, MED TO HIGH PLASTIC, ROOTS, BLACK MOTTLING W/ FEW IRON CONCRETIONS		2/3/5/8	18"/24"	SS-1	9:36 A TIP = 0.5 PPM SAMPLE TIP = 0.1 PPM IN BREATHING ZONE
2						
3	BROWN SANDY CLAY W/ LITTLE GRAVEL, MEDIUM PLASTIC, WET FIRST 6"		7/7/9/8	13"/24"	SS-2	9:41 A TIP = 0 PPM SAMPLE TIP = 0 PPM IN BREATHING ZONE
4	GRAY CLAY ROOTS, MOTTLED, WET					
5	DARK GRAY TO DARK BROWN CLAY, WET W/ GRAVEL UPPER 12", LOW PLASTIC, MOIST AT BOTTOM		5/7/4/5	22.5"/24"	SS-3	TIP = 0.3 PPM SAMPLE TIP = 0.1 PPM IN BREATHING ZONE
6						
7	DARK BROWN CLAY, MOIST, MED PLASTIC, ROOTS, WET UPPER 12"		3/5/6/8	23.25"/24"	SS-4	TIP = 0.4 PPM SAMPLE TIP = 0 PPM IN BREATHING ZONE
8						
9	DARK BROWN CLAY, MOIST, MED PLASTIC		7/10/10/13	23"/24"	SS-5	10:01 A TIP = 0.3 PPM SAMPLE TIP = 0 PPM IN BREATHING ZONE
10	GRAY - ORANGE MOTTLED CLAY W/ IRON CONCRETIONS					
11	TOTAL DEPTH 10.5'					FINISH
12						
13						

Drilling Log

Project Name: ROSECHEM						Boring No.: B-15	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation: 835.9	Location: Center, Grid 10					Total Footage: 10.5'	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	10.5'	0	5	0	N/A	N/A
Drilling Co.: LAYNE WESTERN					Driller (s): O.J. HARPER / DAVID BOWLES		
Drilling Rig.: AD-2					Type of Penetration Test: STANDARD		
Date: 5-23-89	To: 5-23-89				Field Observer (s): HILDEBRANDT, ROBINSON		

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD						START
1	CLAY W/ GRAVEL, LOW TO MED PLASTIC, ROOTS, MOTTLING - BLACK		4/5/7/7	14.5"/24"	1	SS-1	TIP = 1.2 PPM SAMPLE TIP = 0.2 PPM IN BREATHING ZONE
2					2		
3	DARK BROWN CLAY, LOW PLASTIC MOTTLING		11/10/15/15	13.75"/24"	3	SS-2	TIP = 1.0 PPM SAMPLE TIP = 0 PPM IN BREATHING ZONE TOOK PCB DUPLICATE
4					4		
5	DARK BROWN CLAY, MED PLASTIC, CRUMBLY, FEW IRON CONCRETIONS		9/9/11/10	15"/24"	5	SS-3	9:11 A TIP = 0.1 PPM SAMPLE TIP = 0 PPM IN BREATHING ZONE TOOK VOA DUPLICATE
6					6		
7	DARK BROWN CLAY, MOIST, MED TO HIGH PLASTIC		8/9/10/11	22"/24"	7	SS-4	TIP = 0.1 PPM SAMPLE TIP = 0 PPM IN BREATHING ZONE
8					8		
9	DARK BROWN CLAY W/ GRAVEL, MOIST, MED PLASTIC		12/11/11/12	24"/24"	9	SS-5	TIP = 0.1 PPM SAMPLE TIP = 0.2 PPM IN BREATHING ZONE
10	GRAY & ORANGE MOTTLED CLAY, STIFF, IRON CONCRETIONS				10		
11	TOTAL DEPTH 10.5'				11		FINISH
12					12		
13					13		

Drilling Log

Project Name: ROSECHEM						Boring No.: B-16	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation: 835.9		Location: N 1/2, GRID 10				Total Footage: 8.5'	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	8.5'	0	4	0	N/A	N/A

Drilling Co.: LAYNE WESTERN		Driller (s): O.J. HARPER / DAVID BOWLES	
Drilling Rig: AD-2		Type of Penetration Test: STANDARD	
Date: 5-23-89	To: 5-23-89	Field Observer (s): M. HILDEBRANDT / S. ROBINSON	

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD					START 8:00 A
1	GRAVEL W/ BROWN CLAY		2/3/7/11	18"/24"	SS-1	8:12 A TIP = 15 PPM SAMPLE
2						
	ORANGE + GRAY CLAY W/ GRAVEL MIX, HIGHLY PLASTIC					
3			4/7/11/14	11"/24"	SS-2	8:22 A TIP = 22 PPM SAMPLE
4	CLAY, MOIST, MEDIUM PLASTIC, ROOTS, BROWN-ORANGE MOTTLING					
5	DARK BROWN CLAY, MOIST, MEDIUM PLASTIC, ROOTS, NOT STIFF		8/7/10/10	15"/24"	SS-3	8:35 A TIP = 11.8 PPM SAMPLE TIP = 0.3 PPM BREATHING ZONE
6						
7	DARK BROWN CLAY, MOIST, MEDIUM PLASTIC		13/15/18/20	24"/24"	SS-4	8:50 A TIP = 1.5 PPM SAMPLE TIP = 0.3 PPM BREATHING ZONE
8	GRAY + ORANGE MOTTLED CLAY, IRON CONCRETIONS					
9	TOTAL DEPTH 8.5'					FINISH 8:50 A
10						
11						
12						
13						

Drilling Log

Project Name	Boring No.
ROSECHEM	B-17
Project No.	**Page** of
88-025-4	1 / 1

Ground Elevation	Location	Total Footage
835.8	NE¼, GRID 10	10.5'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	10.4'	0.1'	5	0	N/A	N/A

Drilling Co. LAYNE WESTERN	**Driller (s)** O.J. HARPER / DAVED BOWLES
Drilling Rig. AD-2	**Type of Penetration Test** STANDARD
Date 5-23-89 **To** 5-23-89	**Field Observer (s)** HILDEBRANDT, ROBINSON

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD						START
1	1" FINE GRAVEL ORANGE + BROWN MOTTLED CLAY		3/5/5/8	17"/24"	1	SS-1	1:41 P TIP = 0 PPM SAMP = 0 PPM B.Z. = 0.1 PPM B.H.
2	DARK BROWN TO DARK GRAY CLAY, MED PLASTIC, ROOTS, FEW IRON CONCRETIONS				2		
3	AS ABOVE		10/9/11/12	17"/24"	3	SS-2	1:50 P TIP = 0.1 PPM SAMP = 0 PPM B.Z. = 0.1 PPM B.H.
4					4		
5	DARK BROWN CLAY, LOW TO MED PLASTIC ROOTS		11/6/9/9	17"/24"	5	SS-3	TIP = 0 PPM SAMP = 0 PPM B.Z. = 0 PPM B.H.
6					6		
7	DARK BROWN CLAY, MED PLASTIC, ROOTS, FEW IRON CONCRETIONS		8/10/9/10	18"/24"	7	SS-4	TIP = 0.1 PPM SAMP = 0 PPM B.Z. = 0 PPM B.H.
8					8		
9	AS ABOVE, FEW SMALL GRAVEL		9/9/11/2	24"/24"	9	SS-5	TIP = 0.1 PPM SAMP = 0 PPM B.Z. = 0 PPM B.H.
10	GRAY + ORANGE MOTTLED CLAY W/ IRON CONCRETIONS, FEW GRAVEL				10		
	SHALE, WEATHERED						
11	TOTAL DEPTH 10.5'				11		FINISH
12					12		
13					13		

Drilling Log

Project Name		Boring No.
ROSECRANS		B-18
Project No.		**Page** 1 of 1
88-025-4		
Ground Elevation	**Location**	**Total Footage**
835.8	SE¼, GRID 9	12.5'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	11.3'	1.2'	6	0	N/A	N/A

Drilling Co.	LAYNE WESTERN	**Driller (s)**	O.J. HARPER / DAVID BOWLES
Drilling Rig.	AD-2	**Type of Penetration Test**	STANDARD
Date	5-23-89 **To** 5-23-89	**Field Observer (s)**	HILDEBRANDT, ROBINSON

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD						START
1	GRAVEL		7/4/1/1	14"/24"	1	SS-1	12:45 P TIP = 0 PPM SAMPL
2	DARK BROWN CLAY, MOIST, MED TO HIGH PLASTIC, IRON STAINING				2		= 0 PPM B.Z.
3	AS ABOVE, MED PLASTIC, GRAVELLY		7/4/6/4	11"/24"	3	SS-2	1:00 P TIP = 0 PPM SAMPL = 0 PPM B.Z.
4	DARK BROWN CLAY, MOIST, BLACK MOTTLING				4		= 0.1 PPM B.H.
5	AS ABOVE, GRAVELLY BROWN-GRAY CLAY, HIGH PLASTIC, SOFT		6/8/3/3	13"/24"	5	SS-3	1:09 P TIP = 0 PPM SAMPL = 0 PPM B.Z.
6	DARK BROWN SOIL, MOIST, ROOTS				6		= 0 PPM B.H.
7			8/9/11/11	3"/24"	7	SS-4	1:15 P TIP = 0 PPM SAMPLE = 0 PPM B.Z.
8	DARK BROWN CLAY, MED PLASTIC, SOFT				8		= 0.1 PPM B.H.
9	AS ABOVE, GRAVELLY		10/14/16	3.5"/24"	9	SS-5	TIP = 0 PPM SAMPLE = 0 PPM B.Z.
10	GRAY + ORANGE MOTTLED CLAY, LOW TO MED PLASTIC				10		= 0 PPM B.H.
11	AS ABOVE		19/27/45/53	2"/24"	11	SS-6	TIP = 0 PPM SAMPLE = 0 PPM B.Z.
12	SHALE, WEATHERED				12		= 0 PPM B.H.
13	END OF HOLE 12.5'				13		END

Drilling Log

Project Name	Boring No.
ROSECHEM	B-19
Project No.	**Page** / **of**
89-025-4	1 / 1

Ground Elevation	Location	Total Footage
835.7	SW 1/4, GRID 9	12.5'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	12.1'	0.4'	6	0	N/A	N/A

Drilling Co. LAYNE WESTERN	Driller (s) O.J. HARPER / DAVED BOWLES
Drilling Rig. AD-2	Type of Penetration Test STANDARD
Date 5-23-89 To 5-23-89	Field Observer (s) HILDEBRANDT, ROBINSON

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD						START
	CAVITY UNDER CONCRETE						11:15 A
1	GRAVEL W/ CLAY		3/4/5/6	6"/24"	1	SS-1	TIP = 0.1 PPM SAMP = 0 PPM B.Z. = 0.1 PPM B.H.
2					2		
3	AS ABOVE		6/6/6/3	6"/24"	3	SS-2	TIP = 0.1 PPM SAMP = 0 PPM B.Z.
4					4		
5	BROWN CLAY, MED TO HIGH PLASTIC, BLACK + RED MOTTLING. SOME WOOD FRAGMENTS @ 6'		3/3/3/6	13.25"/24"	5	SS-3	TIP = 0.1 PPM SAMP = 0 PPM B.Z. = 0 PPM B.H.
6					6		
7	4" BROWN CLAY, RED/BROWN GRAY MOTTLING W/ IRON STAINING, MED TO HIGH PLASTIC, SMALL GRAVEL LAYER		9/10/9/11	12"/24"	7	SS-4	TIP = 0.1 PPM SAMPL = 0 PPM B.Z. = 0 PPM B.H.
8	DARK BROWN CLAY, MED TO HIGH PLASTIC, ROOTS, W/ IRON STAINING				8		
							11:43 A
9	DARK BROWN CLAY, MED PLASTIC		10/11/11/13	13"/24"	9	SS-5	TIP = 0 PPM SAMPL = 0 PPM B.Z.
10	GRAY + ORANGE MOTTLED CLAY W/ IRON CONCRETIONS AS ABOVE W/ ROCKS				10		
11	GRAY - ORANGE MOTTLED CLAY W/ BLACK MOTTLING		17/18/22/30	13.5"/24"	11	SS-6	TIP = 0.1 PPM SAMP = 0 PPM B.Z. = 0 PPM B.H.
12					12		
	WEATHERED SHALE						
	TOTAL DEPTH 12.5'						FINISH
13					13		

Drilling Log

Project Name: ROSECHEM						Boring No.: B-20	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation: 835.7		Location: NW 4, GRID 1				Total Footage: 12.5'	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	12.0'	0.5'	6	0	N/A	N/A
Drilling Co.: LAYNE WESTERN					Driller (s): O.J. HARPER / DAVID BOWLES		
Drilling Rig: AD-2					Type of Penetration Test: STANDARD		
Date: 5-23-89	To: 5-23-89				Field Observer (s): HILDEBRANDT, ROBINSON		

Depth	Description	Class.	Blow Count	Recov.		Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD						START 2:15 P
1	GRAVEL, SILT		3/3/4/5	7"/24"	1	SS-1	TRIED AUGER THRU CONCRETE TIP = 0 PPM SAMP = 0 PPM B.Z. = 0 PPM B.H.
2					2		
3	LARGE PIECES CONCRETE		5/5/5/2	9"/24"	3	SS-2	TIP = 0 PPM SAMP = 0 " B.Z. = 0 " B.H.
4					4		DO NOT TEST
5	GRAVEL, MED		4/4/5/5	2"/24"	5	SS-3	TIP = 0 PPM SAMP = 0 " B.Z. = 0 " B.H.
6					6		
7	ORANGE CLAY, MED TO HIGH PLASTIC, SL. GRAVELLY		8/6/6/8	24"/24"	7	SS-4	3:00 P TIP = 0 PPM B.Z.
8	GRAY CLAY DARK BROWN CLAY, MED TO LOW PLASTIC W/ ROOTS				8		TOOK BOTH DUP.
9	DARK BROWN TO LIGHT GRAY CLAY, LOW PLASTIC, VERY STIFF, ROOTS, CRUMBLY, GRAVELLY @ 8.5'		12/14/17/22	17"/24"	9	SS-5	3:10 P TIP = 0.1 PPM SAMP = 0 PPM B.Z. = 0.1 PPM B.H.
10					10		
11	GRAY + ORANGE MOTTLED CLAY, MED PLASTICITY W/ IRON CONCRETIONS		12/24/24/25	24"/24"	11	SS-6	TIP = 0 PPM SAMP = 0 PPM B.Z. = 0 PPM B.H.
12	WEATHERED SHALE				12		
13	TOTAL DEPTH 12.5'				13		FINIS -

Drilling Log

Project Name: ROSECHEM						Boring No.: B-21	
Project No.: 88-025-4						Page: 1 of 1	
Ground Elevation: 831.0		Location: NE¼, GRID 1				Total Footage: 8.5'	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. Core Boxes	Depth To Water	Date Measured
HOLLOW STEM AUGER	2"	8.2'	0.3'	4	0	N/A	N/A

Drilling Co.: LAYNE WESTERN		Driller (s): O.J. HARPER / DAVID BOWLES	
Drilling Rig.: AD-2		Type of Penetration Test: STANDARD	
Date: 5-23-89	To: 5-23-89	Field Observer (s): HILDEBRANDT, ROBINSON	

Depth	Description	Class.	Blow Count	Recov.	Sample or Box No.	Remarks
	CONCRETE AND GRAVEL PAD					START
1	DARK BROWN CLAY W/ TRACE SAND, MED PLASTIC		3/5/3/5	9"/24"	SS-1	3:26 P TIP = 0 PPM SAM = 0 PPM B.E
2						
	SAND LAYER					
3	DARK BROWN CLAY, LOW TO MED PLASTIC, ROOTS, IRON CONCRETIONS		6/5/3/4	12"/24"	SS-2	TIP = 0.1 PPM SA = 0 " B.
4						
5	GRAVEL W/ CLAY, 6" WET DARK BROWN-GRAY CLAY, LOW TO MED PLASTIC		3/6/11/12	18"/24"	SS-3	TIP = 0.2 PPM SA = 0 " B.E
6						
	GRAY + ORANGE MOTTLED CLAY, MED PLASTIC, SMALL GRAVEL, W/ IRON CONCRETIONS					
7			21/22/20/21	24"/24"	SS-4	TIP = 0 PPM SAM = 0 " B.2
8						
	SHALE, VERY WEATHERED, CARBONACEOUS					
9	TOTAL DEPTH 8.5'					FINISH
10						
11						
12						
13						